McGraw-Hill International

Management Digest

SEPTEMBER 1957 OVERSEAS EDITION

THE NEW EUROPE · LA NOUVELLE EUROPE · LA NUOVA EUROPA
DAS NEUE EUROPA · LA NUOVA EUROPA · DE NIEUWE EUROPA
DET NYE EUROPA · NOVA EUROPA · DET NYA EUROPA
UUSI EUROPPA · NIGA EVROPA · YENI AVRUPA · H NEA EYPΩΠΗ
The New Europe
THE NEW EUROPE · LA NOUVELLE EUROPE · LA NUOVO EUROPA
. . . what it can mean to businessmen
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WHAT MAKES A MANAGER?

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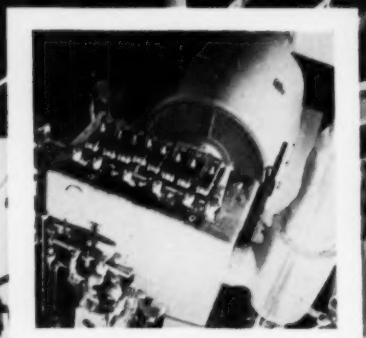

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General Electric equipment helps . . .

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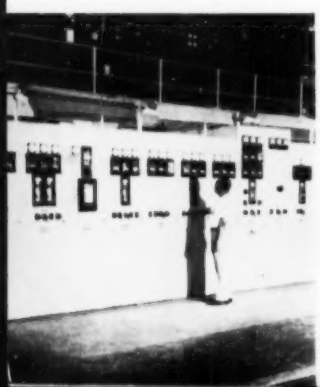

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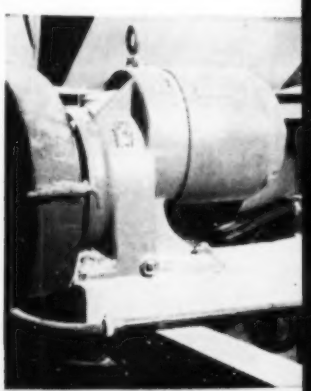

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The Navitimer *(Specially recommended to airmen by the Aircraft Owners' and Pilots' Association AOPA.)*

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The Chronomat, *with slide rule.*

This superb watch is equipped with a circular slide rule. Engineers, architects, business men and professionals have been amazed to find they can wear on their wrist an instrument which performs all the time-consuming calculations of their profession (multiplications, divisions, ratios, exchange conversions, interest, percentages, etc.). This chronograph is also particularly useful to amateurs of motor racing, athletics and cycling, as it enables them to calculate their lap speeds. In addition, the CHRONOMAT is fitted with a tachometer and telemeter for the specialist, and a pulsimeter for doctors. *

* To understand fully how the Chronomat operates, write to Breitling/Geneva for cardboard cut-out working model.

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McGRAW-HILL INTERNATIONAL

SEPTEMBER 1957

VOL. 12, No. 9

Management Digest.

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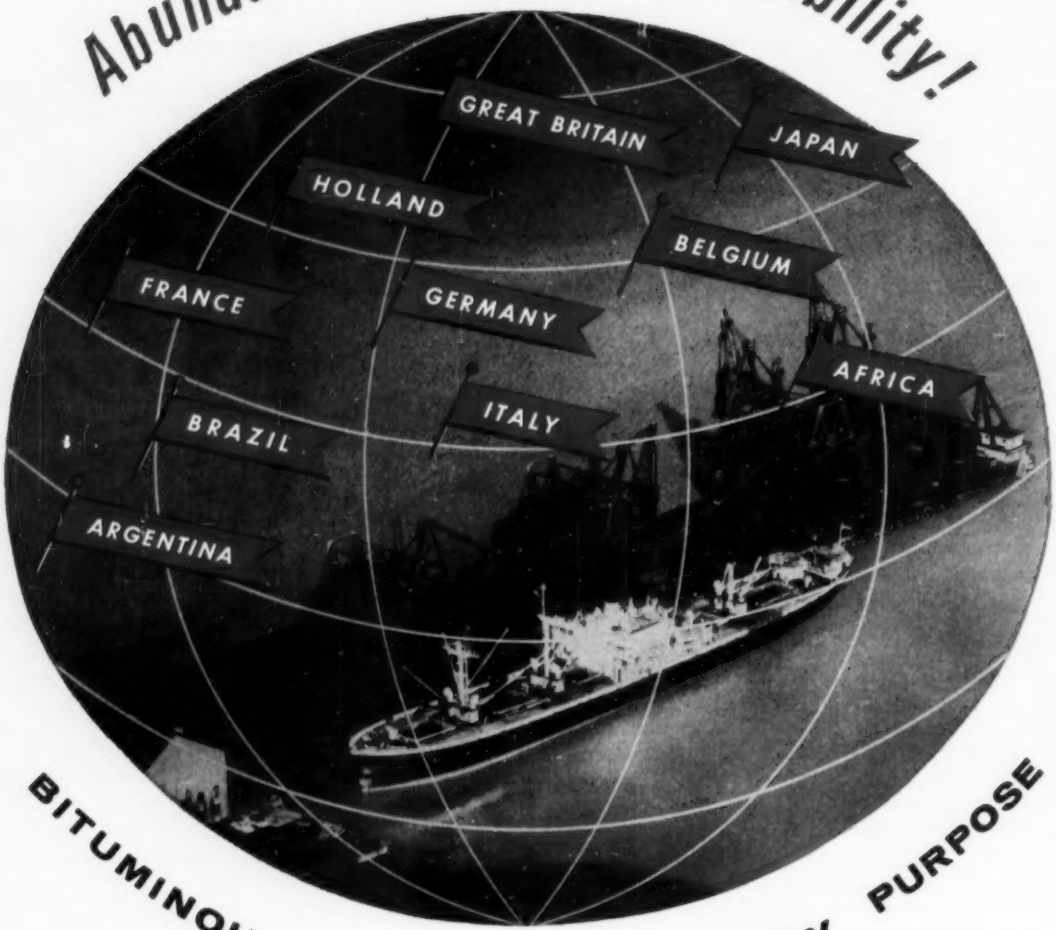

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The Readers Report . . .

NEW YORK CITY
SEPTEMBER 1957

Back from Naples

Sir . . . Upon my return from Naples, where I was elected President of the International Chamber of Commerce, I found MANAGEMENT DIGEST—with my photograph on the cover.

I wish to thank you for the write-up you did on the International Chamber of Commerce in your very interesting magazine. ["Meet the Business Diplomats," May, p 11] I fully agree with the article, which states very well the role played by the ICC. And I personally thank you for the cordial terms you expressed towards its president.

ED. GISCARD D'ESTAING, President ICC
PARIS, FRANCE

Sir . . . While welcoming the publicity you have given to the International Chamber of Commerce, I feel that you could have given a greater emphasis to the Asian countries, and the increasing role they are playing in the ICC.

The ICC has also formed a Commission for Asian and Far Eastern countries called CAFEA, the headquarters of which were first in India and have now been transferred to the Philippines. While your general statement that the ICC is dominated by Europeans and Americans is correct, I think an impartial press should stress further the importance of Asians.

R. G. SARAIYA, O.B.E.
BOMBAY, INDIA

Talk about Taxes

Sir . . . I enjoyed the July 1957 issue of MANAGEMENT DIGEST containing your very fine article "More Business for the Tax Havens", and the extremely valuable tabulation regarding the advantages of Panama and of certain other "tax havens."

I am very much sold on the superiority of Panama as a base country. Accordingly, I offer the following suggestions regarding additional information you might give:

General—Business can be done without losing tax exemption on foreign income.

Tax System—No recurring corporate franchise tax.

Allowable Base Companies—Distribution point for goods handled through Colon Free Zone for reshipment.

Incorporation Laws—Registry tax, and all other fees, including Panama lawyer, bring incorporation charges to $500 to $600.

Unless more than a normal amount of capital is declared, a U. S. attorney's out-of-pocket expenses for all taxes and fees and services of Panamanian attorney, amount to between $450 and $600.

It is not entirely fair to show that you can obtain a Liberian corporation for $500 whereas a Panamanian corporation would cost $1,500. Other things being equal, the cost of a Panamanian corporation will not be any greater.

PAUL D. SEGHERS
SEGHERS & REINHART
NEW YORK

Sir . . . Your July article "Tax Havens" is very interesting, but among the twelve base countries is not mentioned Puerto Rico, which I believe is one of the most attractive.

Besides financial aid, wonderful incentives are being offered to investors interested in establishing factories here.

RICHARD TORRES ACOSTA, C.P.A.
MAYAGUEZ, PUERTO RICO

● Agreed: Manufacturers inside Puerto Rico enjoy highly advantageous tax treatment. However, the term "tax haven" was used to describe a place for an international business to operate "outside of"—and Puerto Rico does not exempt from taxes income earned outside the island by companies incorporated there. —EDITOR

Meeting in Athens

Sir . . . In your June issue you refer to a project for management training planned by an Athens businessman.

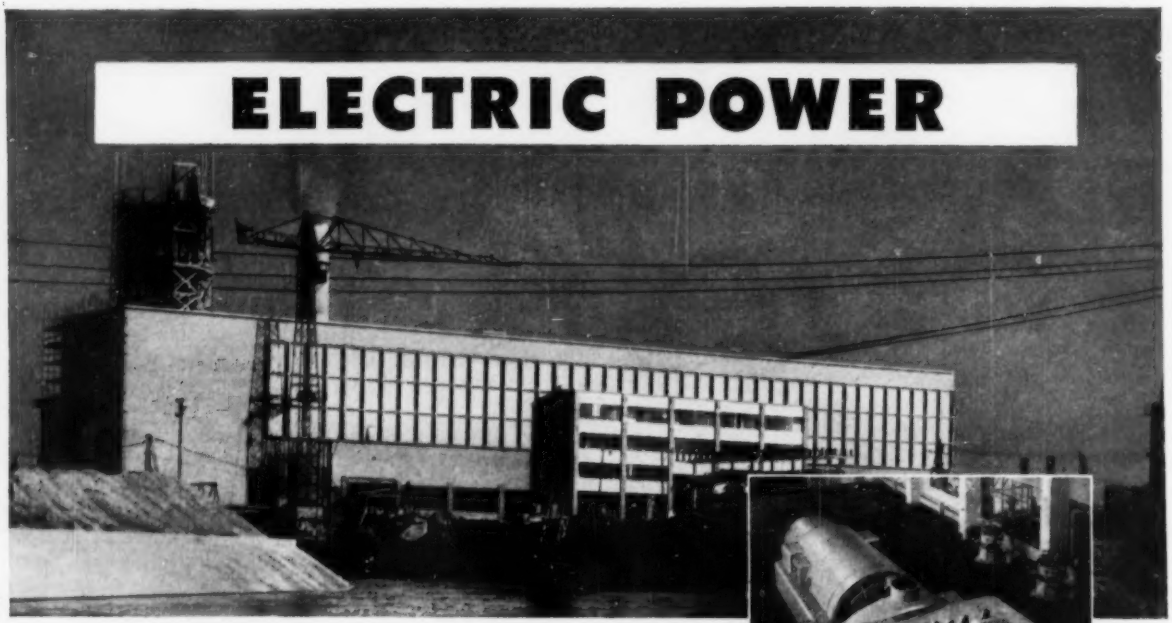
I am myself a young executive and have recently begun applying scientific management in my company.

I would be very willing to assist in such a project. Could you please put me in touch with your subscriber in Athens? You must take great pride in your publication, which is an excellent medium through which businessmen can get to know each other and problems of mutual interest.

NICHOLAS G. CARACASSIS
ATHENS, GREECE

● The men of Athens are now in touch with each other. And the first businessman is also in contact with several U. S. business schools and with U. S. government productivity groups. MANAGEMENT DIGEST is proud to help!—EDITOR

ELECTRIC POWER



30,000 kw Allis-Chalmers steam turbine-generator in the Torino plant. Other units available from 2000 kw through 500,000 kw capacity.

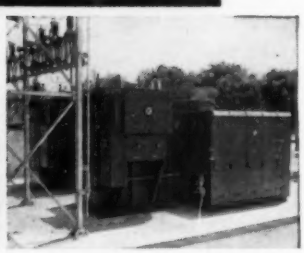
Allis-Chalmers equipment helps meet world power demands

In Torino, Italy, the modern power station shown above uses an Allis-Chalmers steam turbine to expand the nation's production of electric power.

Allis-Chalmers industrial machinery in countries throughout the world is at work to produce not only electric power, but more cement, metals, chemicals, paper and manufactured products.

Every major industry finds Allis-Chalmers a dependable source of basic machinery and valuable application experience. Consult the distributor in your country, or write Allis-Chalmers, Industries Group, Export Department, Milwaukee 1, Wisconsin, U.S.A.

The builder of over 16 million installed hydraulic turbine horsepower, Allis-Chalmers makes all types of hydraulic turbines — Francis, propeller, and impulse.



Allis-Chalmers builds all major equipment for electric power distribution — substations (illustrated), transformers, circuit breakers, and switchgear.

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WORLD TRENDS

A NEW LOOK AT INFLATION

What to do about rising prices and wages? How to maintain stability without endangering business expansion?

These are the questions of governments and businessmen everywhere as they face a mid-1957 outbreak of inflation.

In France, prices of oil, coal, food are up sharply; automatic wage increases are coming soon; foreign reserves dwindle and devaluation of the franc is bruited . . . **In Britain,** Prime Minister Macmillan is trying to marshal his forces for a new anti-inflation battle as living costs, paced by higher wages, move up . . . **In Japan,** stern controls on imports and spending have been imposed on a boom that was getting out of hand . . . **In Sweden,** the chairman of the Riksbank raised the bank rate—and got dismissed for his trouble . . . **In the U.S.A.,** the Federal Reserve Bank's anti-inflation policies forced the Treasury to offer 4% for one-year money —the highest rate in 24 years . . . **In Chile,** prices were shooting upward again despite stabilization measures.

And so on, in nation after nation. But you find little agreement on what to do.

"Too much money chasing too few goods"—excessive demand at existing prices for available goods—is the more familiar kind of inflation.

Yet few of the factors associated with this "demand" inflation are apparent. There is none of the war-enforced liquidity that sent prices spiralling after World War II; nor do you see the combination of forces that caused the Korean up-surge. Money supply has risen very slightly, if at all, in several of the nations threatened by inflation. There is even a drop in demand in some areas, and unused capacity.

Instead, the 1957 inflation fever seems to come from the "cost" rather than the "demand" side.

There are many factors at work. But primarily, you see workers' earnings rising sharply while the rate of productivity growth declines. Governments' commitments to full employment may compound the problem further: Even in the face of a drop in demand, employment in an industry stays high—and the shift of manpower resources to other industries is discouraged. Another factor may well be the production "bottlenecks" in key industries—such as steel, power, capital goods.

What should be done? In the industrial nations, the orthodox method of dealing with inflation has been the use of monetary weapons—tight credit, higher interest rates. Many experts favor this approach still, and insist tight money has helped check dangerous inflation.

This view is being challenged—especially by United Nations economists. They fear that the industrial nations may be risking severe deflation by relying too heavily on tight money. Broad credit restrictions fail to discriminate between types of borrowers, says the U.N., and do not allow for expansion of needed industries and increased mobility of resources.

Others are beginning to echo this dissatisfaction. So look for more "soul-searching," and perhaps less reliance on tight money medicine alone. New policies, and new combinations of familiar policies, are needed.

In less industrially-developed areas—such as Latin America and Asia, inflation pressures are most severe. Yet few governments there have

Turn the page for more WORLD TRENDS

resorted to strong monetary policy. In fact, many use inflationary methods to speed economic development.

One result of the new look at inflation may be less sanctimonious advice from the industrial nations to the less developed. "Until we can do a good deal better than we are," says an American economist, "we cannot give ourselves airs."

NEEDED: BROADER MARKETS

"Latin American nations must seek broader markets if the pace of their economic development is to be maintained." That is the judgment of New York's Chase Manhattan Bank, which has just taken a long look at the Latin American business scene.

The Bank fears that several important stimulants to Latin growth are waning. Lower world commodity prices are reducing the ability to import, and fewer imports will slow industrialization. Further, there are signs that heavy industry development has in several cases outrun the domestic market (in cement, chemicals, some steel products).

One remedy: greater "division of labor" among Latin Americans. And that means greater intra-Latin American trade, which might expand dramatically if artificial barriers were lowered.

But hemisphere-wide trade liberalization (like the European Common Market—page 13) may not be feasible. The Chase economists suggest three regional trade and payments groups—in Central America, and in northern and southern South America.

Latin American businessmen seem to echo these sentiments. Some 235 of them, from 17 countries, came out strongly for increased intra-continental trade at the July conference of the Inter-American Council in Buenos Aires. The businessmen called for (1) progressive reduction of trade barriers; (2) regional groupings; and (3) a "continental congress" of government and business to work out the details of expanding trade.

The delegates in Buenos Aires also went on record against state intervention in business. They are against state imposition of salary scales and social benefits out of line with productivity; they are against nationalization of foreign investments save in the case of "national need."

Ironically—before the ink was dry on the businessmen's recommendations—the Argentine government nationalized the big, European-owned Cia. Argentina de Electricidad. Whatever measure of "national need" is involved in the CADE seizure, outsiders speculate that it will make foreign capital—which Argentina needs—more wary of investing there.

KEEP AN EYE ON IGY

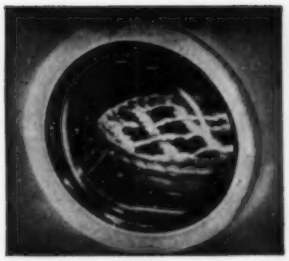
Watch the work of the International Geophysical Year. This vast cooperative effort of 70 nations, under way since July, may turn up some vital information for business. For example:

—**Methods of predicting the behavior of glaciers,** which could save road-builders millions of dollars in areas like Alaska and Switzerland.

—**Improved long-range communications** and navigation techniques. It may become possible to bounce television and radio broadcasts off a lofty layer of air and beam them to distant points.

—**Mineral exploration** may be helped by IGY research into the age of the earth and the nature of its crust. Oil exploration may become far less costly if IGY gravity studies make rock profiles easier.

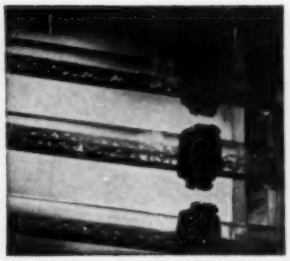
—**Effects on weather** of such things as industry's out-pouring of carbon dioxide into the lower atmosphere.



1 Transparency

You can let customers see inside your product through glass. A good example is the Corning brand oven window that *stays* crystal clear.

It's easy to keep clean.

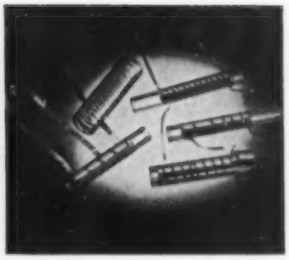


2 Corrosion Resistance

If your product must cope with corrosive liquids or atmospheres, glass will improve its operation, lengthen its life. It's the world's most corrosion-resistant material. The severe service Corning brand pipe stands in chemical plants illustrates the point.

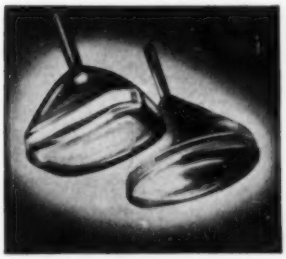
3 Heat Resistant

Where your problem is heat or quick changes from hot to cold, Corning brand glass No. 7740 will stand temperatures below zero to 250° F. VYCOR brand glasses go to 1800° F. Picture shows pouring hot metal into VYCOR dish on cake of ice.



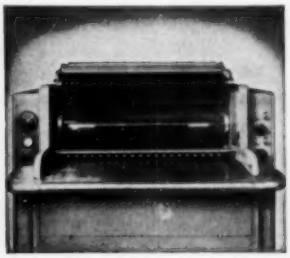
4 Electrical Stability

Metal bonded to glass forms which have high dielectric strength and low temperature coefficient makes inductances and capacitors of exceptional stability. Electronics industry uses tens of thousands of the glass inductances shown in the picture.



5 Hermetic Enclosure

Glass forms perfect glass-to-glass or glass-to-metal seals for vacuum-tight applications. Vacuum bottles are a good example. So are TV tubes and sealed beam headlights.



6 Light Transmission

Glass can accurately control and transmit light with permanent reliability. Good examples are all around you but one rather unusual one is the glass cylinder in this printing machine. It transmits the ultraviolet rays produced by a mercury arc lamp.

7 Heat Generation

Although you normally think of glass as an electrical insulator, Corning's E-C glass conducts electricity and radiates heat. E-C glass is ideal for space heaters, dryers, and other applications especially where an *even* heat distribution is wanted.

8 Purity

This man is looking through a solid bar (*one meter long*) of absolutely colorless glass—*the purest glass ever made.* It was produced at Corning Glass Works, and was considered impossible a few years ago. Now it promises better vision—through glass—for the future.

8 properties of glass to help you make better products

These eight properties give you only an indication of the versatility of glass by Corning.

This remarkable material can be made extra strong or weak, to conduct electricity or act as an insulator, to pass light or cut it off in virtually any size, shape or color you need.

It may pay you well, in terms of better operating characteristics, lower production costs, and extra sales points for your product, to consult Corning engineers before you reach the blueprint stage. For further information, just mail the coupon or write for a copy of, *"GLASS—its increasing importance in product design."*

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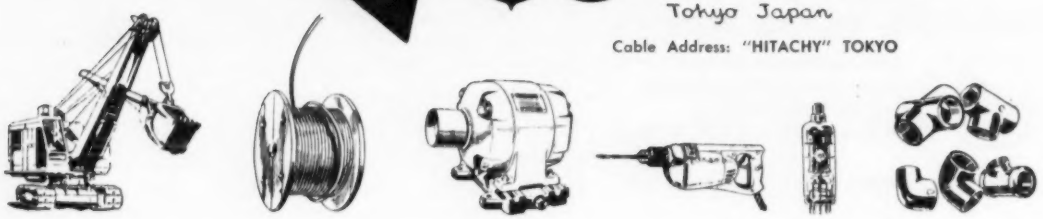
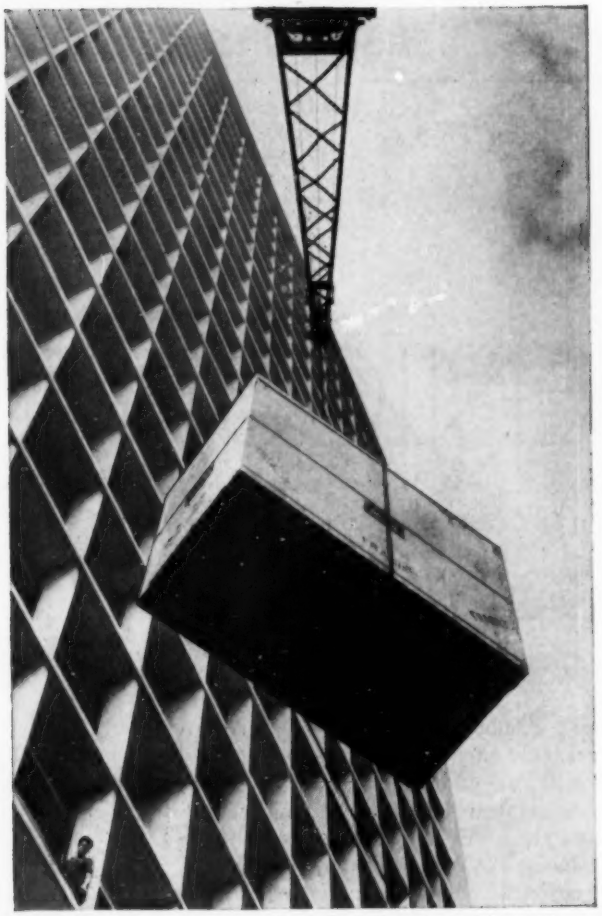




SYMBOLIC of the new business spirit in Latin America, is this crated component of a Univac data-processing system being lifted into a modern office building in Venezuela. It performs, in minutes, computing and processing operations that would normally take many months. There is a UNIVAC data-processing system for every type of business, government or scientific organization.

COSTS:

they're at an all-time high...and still climbing

But the Latin American businessman has good reason to be optimistic!

Despite steadily rising costs for raw materials and labor, businessmen from Mexico City to Buenos Aires are planning for the future with a well-warranted air of optimism. The past decade has seen a rate of economic growth that is nothing short of phenomenal: a 5½% increase in gross national product per annum for the Latin American countries as a group, as compared to a 5% increase in Europe and 4% in the United States.

The experts attribute this vigor to a variety of factors: the basic soundness of the economy . . . a scarcely-scratched industrial potential, coupled with a steady increase in foreign investment . . . and a continent-wide "re-tooling" of business procedures along modern, more efficient lines. The high-point of this modernization program is typified by the Remington Rand UNIVAC® family of data-processing systems.

GROSS NATIONAL PRODUCT
Comparative growth (approximate) in three major world areas—1947-57

5½%	5%	4%
LATIN AMERICA	EUROPE	U. S. A.

Economy through efficiency—with UNIVAC

AT EL COMANDANTE RACE-TRACK in Puerto Rico, a highly complicated system of pool betting required the services of 180 people working all night. UNIVAC and 12 people now do the job with unfailing accuracy — with results on the Board minutes after the last race!

AT THE DEPARTMENT OF WATER SUPPLY in Sao Paulo, UNIVAC keeps costs *down*, efficiency *up!* It processes bills for over 300,000 accounts per month *in half the previous time!* Produces complex statistical analyses and reports incredibly fast.

AT THE MEXICAN TELEPHONE COMPANY in Mexico City D.F., UNIVAC streamlines billing, controls long distance service, produces rapid traffic and load studies never before possible!

UNIVAC DATA-PROCESSING...Cuts the cost of doing business...creates more useful jobs for your employees...puts your company in a better competitive position

APPLIED CRYOGENICS...

a new process environment

Strange things happen to gases, liquids and solids at the low end of the temperature scale. Many techniques long used at normal process temperatures serve with surprisingly effective results at extremely low temperatures. Heat- and mass-transfer purification processes, mechanical separations, stabilization of highly reactive chemicals and transport of liquefied gases are among the current list of profitable cryogenic applications . . . and the end of new possibilities is not in sight.

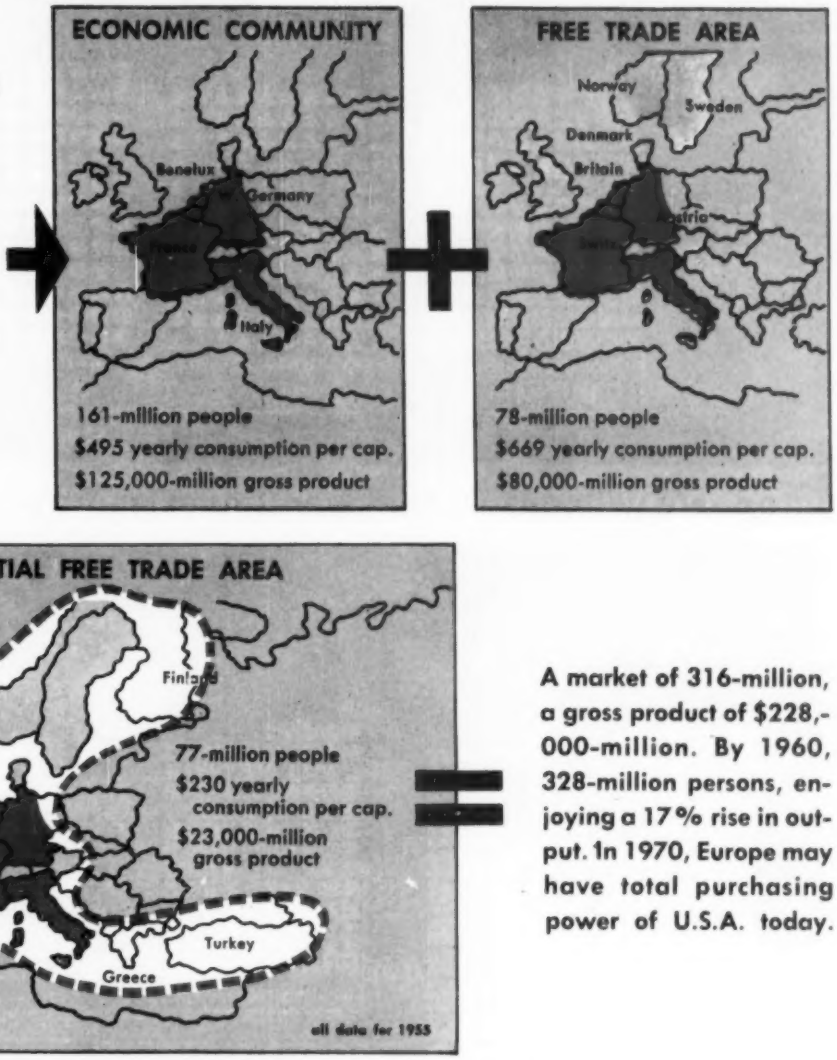
Air Products is on firm ground in this strange cold world. Its lifelong experience in the liquefaction and separation of gases has developed familiarity with low temperature phenomena and established its leadership in the field of applied cryogenics.

Steel mills, chemical plants, rocket and missile installations depend on Air Products' equipment to provide reliable supplies of high purity gases and liquids from a wide variety of atmospheres and feedstocks.

Possibly some phase of this expanding technology may be useful in your work or help you to solve a difficult process problem. For informed assistance, call or write Air Products, Incorporated, P.O. Box 538, Allentown, Penna.

Air Products
...INCORPORATED

A new Europe is in the making—and it will alter the business pattern of the world. Unity will come slowly, painfully—perhaps in the stages shown here But you had better plan for it.



A market of 316-million, a gross product of $228,-000-million. By 1960, 328-million persons, enjoying a 17% rise in output. In 1970, Europe may have total purchasing power of U.S.A. today.

Changing the Map of Europe

IN EUROPE this month, events are shaping that will have tremendous impact on world business—as important, perhaps, as the combined impact of the French and Industrial revolutions of the 19th Century. In just 15 years, Europe may have a single mass market. In years beyond, the map may even show a "United States of Europe."

The birth of the new Europe will be slow, painful. But it was solidly launched in July, when France ratified the treaties establishing an Economic Community and the Euratom nuclear pool. West Germany had already ratified, and the other four members—Italy and Benelux—were sure to follow.

Early next year, the first steps toward establishing a customs union will be taken. Meanwhile, this month, The Six are sitting down with Britons, Scandinavians, Austrians, and Swiss to discuss a plan to associate those countries with the Common Market.

The stakes are immense:

—If Europe achieves its goal of unity, it will remain a dynamic economic force in the world.

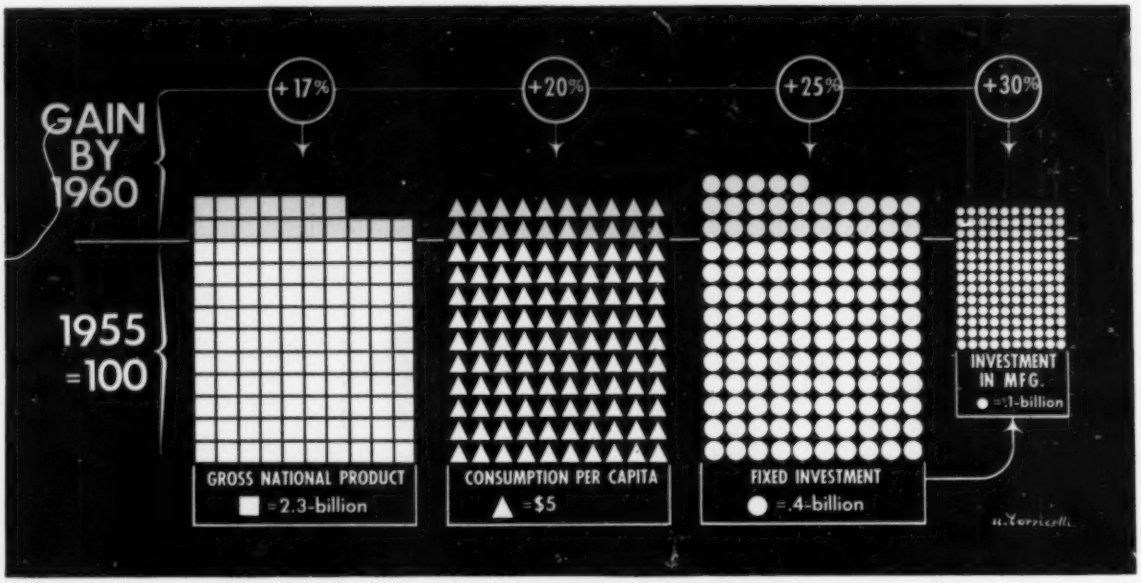
—If it doesn't, the area could become something of an economic back-water over the next 100 years.

This special report, digested from *Business Week* magazine, tries to put the New Europe into perspective for businessmen.

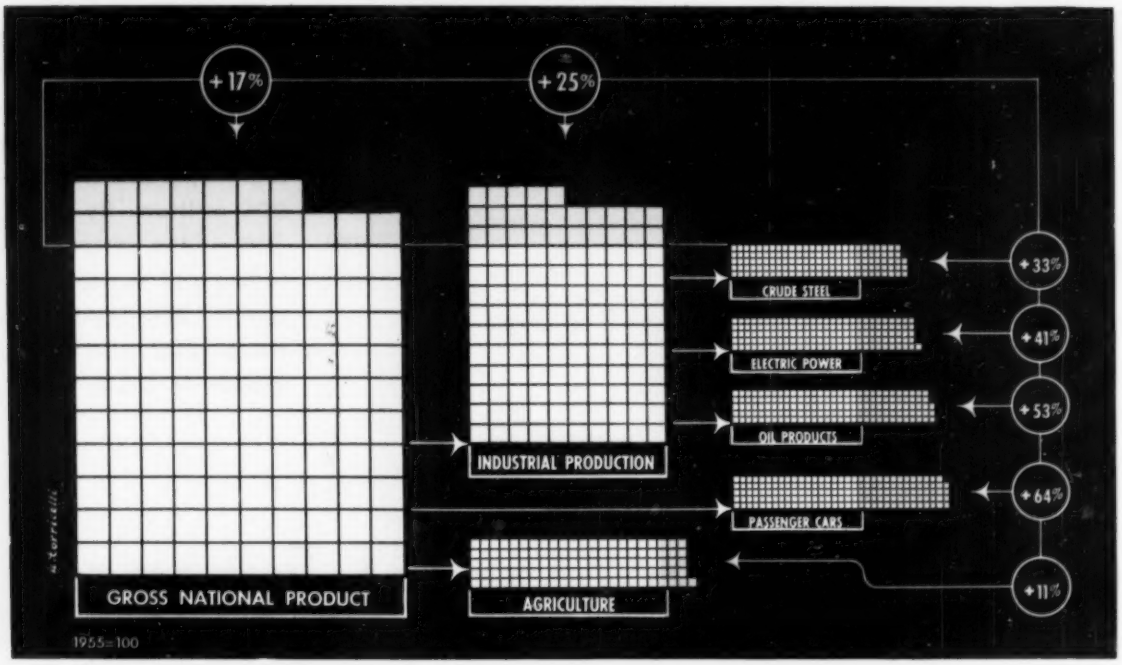
I. Forces for Unity

Four compelling facts are pushing Europe toward economic integration:

One is the "new" industrial revolution, now transforming the



Europeans will consume more and invest more as their GNP rises...



...while production makes gains like these in the "new" Europe.

economic life of the Continent.

Second is the shift in world power relations, which has left Europe standing resentfully weak —as at Suez—between the two world superpowers, the U.S.A. and U.S.S.R.

Third, the postwar political changes in one-time colonies of Asia, Africa, and the Middle East are forcing Europeans to compete for markets and raw materials without the favored position they once enjoyed.

Finally, U.S. military and economic support, and the pressure that went with it, compelled Europeans to set up joint economic institutions—the European Payments Union, the Organization for European Economic Cooperation. The Coal-Steel Community followed later, at the time when NATO was giving Europe a common defense system and a sense of security.

There is no doubt that an industrial renaissance is taking place in Europe.

You see it in the self-service stores of Switzerland, the traffic jams in Paris or Rome, the television antennae, the expansions,

mergers, and modernizations of big industry.

You see it in the new distribution of incomes, moving an important share of European workers into a burgeoning middle class.

You see it in the statistics just produced by OEEC for its recent study "Europe Today and in 1960" (MD, June, p7). From 1951 to 1955, European economic growth has been faster than that of the U.S.A., and the OEEC suggests that that growth will continue.

This growth—much of it based on the spread of mass production and a new expansionist philosophy—has convinced business leaders and politicians alike of the advantages of a single market. Just as growth to date has helped pave the way for unity, so unity is expected to insure rapid, perhaps even explosive, growth tomorrow.

There are also more subtle factors. In France, for example, nationalism may still burn deep in the older generation. But even an old-school French executive will admit that his sons' real interests lie in the future of Europe as a whole. Meanwhile, the sons become more middle class, voting for politicians who stress ways to promote the comforts of life and international cooperation rather than imperial glory.

Meanwhile, from the sidelines across the Atlantic, the U.S. government is discreetly cheering European unity. And while a few American businessmen are not joining the cheers—most are benevolently indifferent. And some are quite enthusiastic.

II. The Impact of Unity

The mechanics of unity are still in doubt, but Europe will probably manage to put together some form of close-knit Economic Community and a larger associated Free Trade Area. If it does, what will happen to European industry and markets?

Americans and, for example, Japanese, feel that some of their business in manufactured exports will be squeezed (at least temporarily) by tariff changes coming with the Common Market. Raw material-exporting nations, such as the Latin Americans (page 7), are worrying about the preferences that the Common Market gives to Europe's African colonies.

Already American businessmen are reconsidering their plans for doing business in Europe. Those with only an export business are searching for new licensing agreements or outright manufacturing deals. Others, with part manufacturing, part export, investment in Europe, are wondering if they should not produce everything on the spot. In general, U.S. businessmen expect a relatively smaller export market and a relatively larger opportunity for profitable direct investment.

III. Business Gets Ready

These broad calculations may not mean much today. But it is plain that among businessmen in Europe, as among their foreign counterparts with interests there, new types of management decisions are in the making.

Mergers in Britain and France have been concluded in several key industries—all with an eye toward the single market. The French auto industry is beginning to brace for its first real home-market competition. Food merchants are talking of a joint-venture supermarket chain to operate in several nations, buying wherever supplies are cheapest. Airlines and railroads are wondering how "free movement" in the Common Market will affect them. Oil companies speculate that they may have to drastically change their marketing—now set up on a national basis.

Everywhere, you hear talk of the need for more efficient management—of production, marketing, costs, and, above all, investment. Businessmen cannot be sure just what is coming. But they are girding for big changes.

IV. How It Will Work

The goals of the Economic Community are very nearly Utopian—nothing less than the creation of an Old World version of the U.S. market among six ancient and proud peoples who have feuded, one with another, over many centuries. The Six agreed to work for "an ever closer union among the European peoples" in order to raise "living and working conditions." One of history's most complex treaties was drafted to accomplish these aims. It calls for:

—**A customs union for industrial goods;** after a transition period of 12 to 15 years, free movement of trade inside the community and a common tariff policy toward outsiders.

—**A common policy toward agriculture.**

—**Free movement of persons, services, capital.** At the latest, workers should be able to move freely after 15 years.

—**A common transport policy,** with removal of all differential freight rates and complete interchangeability of facilities.

—**A catch-all group of principles.** One is supposed to insure fair business competition, others to harmonize labor laws, social and fiscal policies.

—**The Eurafrica scheme,** to associate the Community with overseas territories of members.

The responsibility for carrying out these principles will lie with a new set of European political institutions—an assembly of the Six, a council of ministers, a court.

V. Heart of the Matter

But the heart of the matter is the customs union. Everything hangs on its success.

Tariff reductions and quota removal are to be accomplished by stages of four years each. Between the first two stages, a "stalling" period will be allowed if any members find the process too difficult.

During the first stage, tariffs are to come down under a complex formula. It provides for an average overall reduction of 30% in each member's tariffs, and a cut of at least 25% in the basic duty on each product. By the end of the second stage, average duties are to be down by 60%, and on each product by 50%.

The Community's common tariffs to outsiders, as a general rule, are to be fixed at the "arithmetic average of the duties levied on the four customs areas" (Benelux already counts as one). But ceilings ranging from 3% to 25% have already been placed on several groups of products. And

PROSPERITY is reflected in the thick traffic that clogs Europe's big cities.

INDUSTRY is gearing its expansion to the prospect of a single market. This huge cracking plant in England is the pride of Imperial Chemical Industries Ltd., . . .

many products have already been assigned fixed tariffs for part of the transitional period; and some others will be duty-free.

As the common tariff takes effect, the higher-tariff members (such as France and Italy) will have to reduce levies. But lower-tariff nations—Germany and Benelux—will have to raise some.

One important result of the common tariff is this: Industries in Belgium, Holland, Germany will have to pay tariffs on some of their raw materials now arriving duty-free. This will tend to put them at a disadvantage, since rivals outside—in Britain, say—will continue to import the materials duty-free.

The members will also be at a disadvantage in relation to France, who—for a time—is allowed to keep its export subsidies and import taxes. The concessions were made to insure that France would ratify the treaty. But they highlight the gravest problem of the Community.

VI. Problems, Prospects

In plain fact, the Economic Community is a marriage of strong economies and weak. Basically, it is a wedding of Germany—with its competitive exports, hard currency, strong reserves—and France, with its protected industries, weak currency, dwindling reserves.

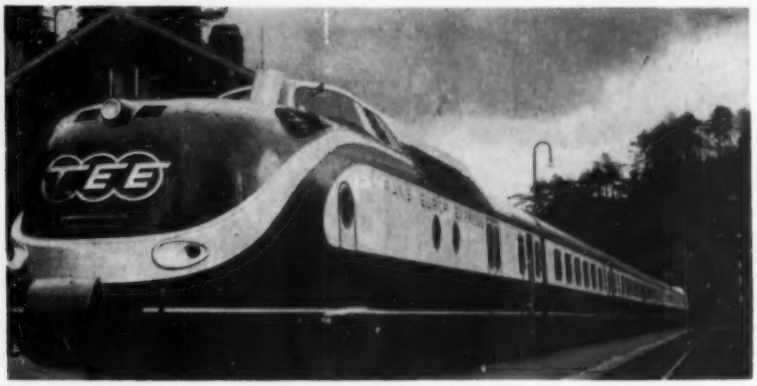
This points up the problem of political and "social" stability in France now—perhaps somewhere else later. Lack of this stability (some call it "national cohesion") largely accounts for the way France has more than once drifted into inflation, and into financial crises such as the present one. And inflation may well be the Economic Community's chief problem. In dealing with inflation there will be times when what is good for the Community as a whole may be bad—politically bad—for a particular government.

At the industrial level, too, there may be trouble. There are certain to be attempts to form "Community cartels" as competition intensifies. Stiff regulation of them will be difficult, at least in the beginning; the Community authorities will have no supranational powers in the real sense of the word. Eventually, the Community political assembly may be elected by universal suffrage. This, the enthusiastic "Europeans" say, will be the first step to real executive power.

More important, the ardent European unionists view the six-nation Community as only the nucleus of a much larger group. Plans have already been drawn to surround the Economic Community with a Free Trade Area for industrial goods. At the start, the Area would include Britain, Sweden, Norway, Denmark, Switz-

. . . a big British firm that expects to do very well in the "new competition" of Europe.

DISTRIBUTION becomes "Americanized' as the supermarket appears. Businessmen now talk of chains of food stores operating in the Common Market.



FREE MOVEMENT, promised in Common Market, is dramatized by "Trans Europ Express," new rail service which cuts border formalities to minimum.

erland, and Austria. These nations would agree with the Community to lower trade barriers among one another and with The Six, on a schedule paralleling that of the Economic Community.

Finally, the Free Trade Area would be joined by "fringe" countries—such as Greece, Turkey, Spain, Portugal, Eire, Iceland, Finland. Some of these nations are agricultural, at a different stage of development; to join, they might need concessions comparable to those France received. And Finland would have to adjust membership in the Free Trade Area with the special trade position forced on it by the Soviets.

The Free Trade Area is British-sponsored, put forward when London decided it could not afford to see the Continent (especially with a dominant Germany) grow in competitive power while British exports faced a tariff disadvantage. But at no point has London seriously considered joining the Community. That would mean giving up the imperial preference system entirely, loosening Commonwealth ties, modifying the British role in world finance.

Instead, the British say they will open their borders to The Six and to the Area members—but maintain their own tariffs and quotas against the rest of the world. And most important, the Free Trade Area agreement would not include agricultural products.

The French do not like this exclusion at all; and some French officials are dubious about the entire Free Trade Area idea. They argue that the Community can do better on its own. The Germans, Dutch, and Italians, on the other hand, seem quite willing to reach an accord with London. All in all, it seems likely that a Free Trade Area will be negotiated.

But it will be as difficult to conclude as was the Economic Community pact. One problem will be in defining "country of origin" of imported goods. This is easy in the Economic Community, not so in the Free Trade area.

For example, goods entering Britain will be liable to different tariffs depending on origin. But all countries in the Free Trade Area would not be applying the same tests. And that would allow goods to enter the Area via the nation with the lowest tariff, then move within the Area duty-free until they reach the nation with the highest tariffs. The Six also fear that Britain might import, say, semi-finished textiles from Hong Kong, process them, and ship them into the Common Market.

The agricultural problem may be one of the most difficult. But even that may succumb to compromise, and Britain will probably have to enter the Community's managed market for farm goods at least part way. ●

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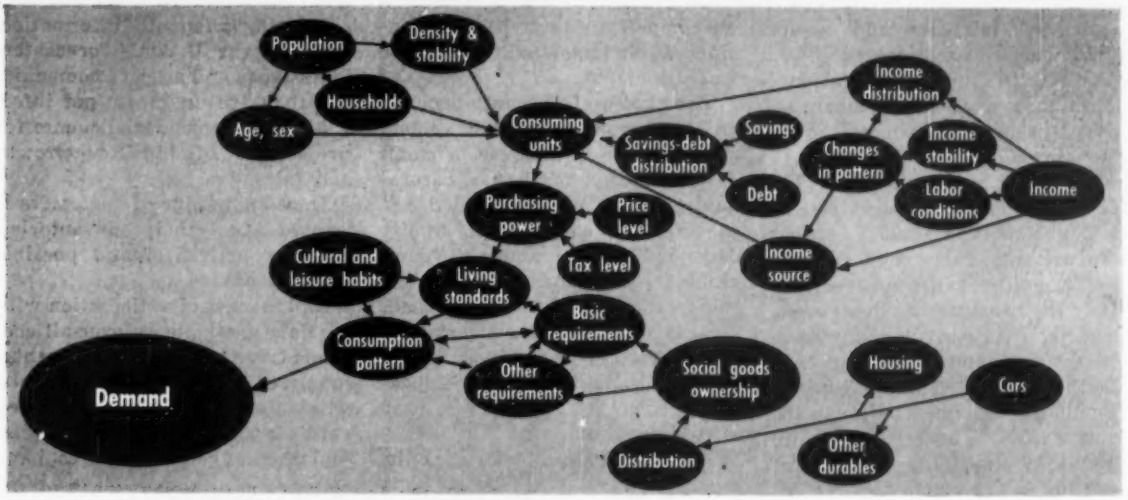


"COMPLETE INFORMATION SYSTEM" highlights the current search for better sales forecasting methods.

Needed: A Crystal Ball for Sales

Companies are trying to reduce the role of guesses in forecasting. But marketing men say they need more and better information.

Sales forecasting is a relatively simple procedure for most businesses. The most important factors are the past sales trend and the estimate of future business—leavened by management's judgment and plain guess-work.

But today there is a determined effort to improve forecasting methods and to lessen the role of guessing. The field is becoming more and more complex. In fact, some of the newer techniques seem to demand that marketing men have advanced degrees in the social sciences or even psychoanalysis. And that is one of the reasons sales research departments are springing up, and why forecasting is being turned over to specially-trained men.

For a sign of things to come, consider the forecasting system of the Monsanto Chemical Co. This company calculates a "coefficient of variation" for the probable level of sales for each product. Its budgeting is based on the statistical variation. As sales deviate from the forecast, the budgets are quickly changed to predetermined levels.

Monsanto has found its own way to solve the ultimate problem of forecasting—to integrate it with production control and budgeting. With the same problem in mind, many companies are bringing in financial men, production men, and others not previously consulted on sales forecasting.

Forecasting can be as complicated as a company wants. According to the U.S.A.'s National Industrial Conference Board, seven techniques are in common use. Marketing men will:

—Take a cross section of executive opinion.

—Combine the individual forecasts of salesmen and sales management.

—Correlate relationships between sales and all other company activities—by statistical methods.

—Analyse the overall business cycle to estimate the probable trend of underlying factors that will effect the company's product.

—Forecast the outlook for an entire industry, then estimate the company's share.

—Analyse product lines and combine the results.

—Analyse end uses of products in major consuming industries.

Much more complex methods are also being explored. For instance, take a look at the Complete Information System (chart, above) developed by Ernest Dale, a U.S. consultant. Dale's goal is to gain insight into "how and why the consumer feels as he does and why he will or will not buy."

"Aggregate attitudes" determine purchasing decisions, according to Dale, and these attitudes involve estimates of income and purchasing power patterns, occupation (or industry) patterns, spending patterns of dominant income groups, and cultural motivations.

The theory is that the consumer will attempt to keep his relative position in the community. Buying is determined partly by his own opinions, but mainly by the "total response pattern" of the group.

Obviously, any sales manager who wanted to get involved in such concepts of social psychology and statistics would probably have to retain a consultant like Dale. But most sales managers—whether they realize it or not—are interested in social factors. For one thing, a "luxury" market in the U.S.A. has changed into a "necessity" market almost overnight. And marketing men have long made practical use of general data

such as population and "consuming units," distribution of income, consumer liabilities and assets, and leisure-time habits.

Of all the new social science techniques, motivation research—"MR"—is by far the most controversial. (MD, Mar., p36).

In a new book on "MR" (*The Hidden Persuaders,* David McKay & Co., New York. 1957), author Vance Packard describes how the practitioners of the new science study the consumer's subconscious mind, charting his hidden fears, frustrations, and urges, and then use this information to sell goods. "Symbols" are manipulated, the consumer's "consent" is "engineered"—presumably without his knowing it. Some of the advertising and sales tactics springing from MR has aroused bitter criticism and some people argue that the extremes of motivational research are anti-humanistic.

Yet, these ideas have made a deep impression on marketing men. Take this recent statement of General Electric Co.'s vice president for marketing:

"We must focus our businesses on the customer's needs and desires, including those needs and desires that the customer is not aware of. Only after identification of these needs can marketing people take the lead . . . in determining what businesss should do . . . to satisfy the customer."

In practice, however, the main concern of market researchers is trying to reduce the role that guessing plays in forecasting. Relatively few forecasting elements are used by the majority of U.S. firms, a survey by the American Management Assn. shows.

The two most frequently used factors are past sales and an estimate of future business. After these in popularity come general economic indicators, economic data on the company's own industry, salesmen's field reports, plans for new products, activities of competitors, production capacity, market surveys, and the company's promotion plans.

Note, however, that some of the elements in less frequent use are considered very important by the companies that do use them—in particular, information on one's own industry, production capacity, and promotion plans

On the other hand, information on competitors' activities is considered less important than its use would indicate.

The choice of elements depends on the company, but it is seldom arbitrary. For instance, a small soap company, through a careful analysis of its market, decided that the amount of soap used per family depended on the number of young children in the family and the money each family had to spend.

So it bases its sales forecast on 1) the number of families, 2) the size of the families, and 3) disposable income figures—plus its past sales record, of course.

The biggest problem area in sales forecasting, according to the AMA respondents, is the difficulty of getting adequate information. Even in the U.S.A., forecasters in all types and sizes of companies say they are unable to get information they consider adequate for projections of industry growth and sales.

More knowledge of customers is wanted too—their inventories, business activities, and possible future needs.

And there is dissatisfaction with the data available on over-all economic trends. Researchers want a supply of statistics from a stable, reliable source. If possible, they want the statistics in useable form. And the longer the figures have

Ford Vetoes the "Hedge"

SUMMARY OF CONSIDERATIONS IN EVALUATING 1957 PASSENGER CAR VOLUME

FAVORABLE TO HIGHER VOLUME IN 1957 THAN 1956

1. A New Advance in Business Conditions

   A strong upsurge in general business conditions may be expected as steel and durable consumer goods production increases.

2. Consumer Financial Position

   Rising consumer incomes and cash accumulation will accompany the upturn in business enabling consumers to purchase automobiles at higher rates than in 1956.

3. A Strong New Model Stimulus

   Approximately two-thirds of the major makes will have made a substantial model change.

4. Long Term Factors Will Continue to Aid Sales

   The continuing trend toward suburban living, decentralized factories, together with more youngsters and teenagers, favor an expanding market.

UNFAVORABLE TO HIGHER VOLUME

1. Large Stock of Recent Model Cars

   Large car sales in recent years have increased car ownership and lowered the average age of cars on the road. Further sales depend heavily on appealing to customer's desire for automobile improvement.

2. Higher Cost of Trade

   As existing cars become obsolete, the price of used cars declines. This increases the cost of trade on new cars.

3. Repayments in Existing Automobile Loans

   The carry over of repayments from previous years' car financing has mounted rapidly with the lengthening of maturities.

CONCLUSION

Various estimating methods indicate a range from 6.5 to 7.0 million car sales for 1957. In judging the above considerations, it seems probable that sales next year will exceed 6.6 million -- a 10% increase over the 6 million anticipated this year.

COMMON-SENSE APPROACH of the Ford Motor Company: Arguments favorable and unfavorable to higher sales are boiled down into brief, specific comments. Ford believes in strong recommendations, if possible, to defeat the "chronic tendency" of forecasters to hedge. The conclusion at the bottom is just as specific. Incidentally, this early forecast of total 1957 sales by the U.S. auto industry had to be revised downward. But Ford managed to substantially increase its share of the market. (*American Business, July, p34*)

been available, the better.

There is more interest than ever in market surveys—though; as the AMA discovered, they are not yet widely used outside of companies in consumer markets.

For complicated statistical surveys, the actual surveying is almost never done by the company. For one good reason, outside agencies have permanent staffs better qualified to do the job. As one expert on population sampling recently put it: "Good statistical surveys are not accidents, and there are no bargains."

But after the survey is made, the company research department has the crucial task—translating the figures into information that management can use to make decisions.

As might be expected, salesmen's reports are still the backbone of the forecasting system of many companies — particularly those making industrial products. And there is strong conviction in the practice. An executive of the Rockwell Manufacturing Company recently told a conference on marketing that "We honestly feel that our business starts with the salesman and works back."

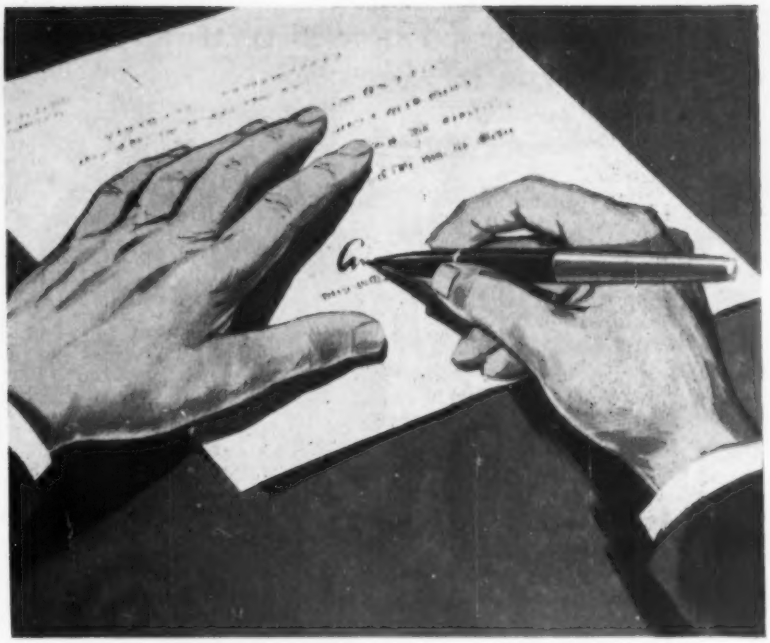
These companies are trying to improve salesmen's reports and to find ways to overcome the natural but dangerous tendency to be over-optimistic or over-pessimistic.

To bolster salesmen's reports, sales analysis is widely used. The punch card system is the favorite method at present.

Usually an analysis is made once a month. Sales are broken down by salesman, product, and customer, or any other variable that will shed light on sales trends.

But remember that an analysis is not a forecast in itself. What it can do is to provide valuable information on seasonal factors, profitable and unprofitable products, and customer habits. Users report that sales analysis is particularly useful in periods of declining sales—to help discover the reasons why.

Whatever the forecasting technique, its adequacy can be easily checked by comparing the estimates to actual sales. And all have another thing in common—sales estimates have to be frequently reviewed and revised in the light of new information. ●



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Yes, *economies!* The Remington Rand Foremost Accounting Machine, for example, can reduce your bookkeeping costs by 40%... free key employees for duties essential to growth.

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PEOPLE OF SOUND JUDGEMENT

Ernest L. Schimmel,
Vice President Bell & Howell Company U.S.A.,
President Bell & Howell Canada Ltd.

He keeps the world in focus

Maybe it was from his seagoing great-great-grandfather that he inherited that habit of looking across the dikes of his native Holland. But natural talent really made young Ernest Schimmel conspicuous for his lingual versatility. For his first employer he was a one-man Babel: a correspondent in five different languages. Soon a photographic concern in Europe snared him, had him boss its vast export operations. For fifteen years Ernest Schimmel dashed across the Western hemisphere, leaving accomplished transactions in his wake. The war caught him during a casual trip to the U.S., kept him there. When he joined Bell and Howell Company, it was - inevitably - as its Export Manager. He was cast for the job. He has that rare gift of really understanding his fellow-men.

Within three years he made the vice presidency, in charge of the International Division. And in due course President of Bell & Howell's Canadian branch. He pushes interests and sales in and into 68 countries. Sends exports rocketing to an all-time height, year after year. Ernest Schimmel shuns personal ballyhoo. Characteristically he points towards his real big news: like that B & H 16 mm movie camera, the first that chooses its own exposure stop fully automatically: a man-made human eye. "And that's exactly how KLM operates", this traveller by vocation muses. "KLM has the rapidity, dependability, micro-precision of a high grade camera. Even has its own wide angle: on passenger needs". And for a tripod, KLM uses this planet, Earth.

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All over the world people of sound judgement fly KLM

BUYING AND SELLING raw materials for delivery months in the future is the business of a commodity futures market, such as this grain "trading pit."

The Future of "Futures"

Futures can mean financial protection to manufacturers, profits to speculators. Yet trading in many commodities is weak. Why?

Commodity futures markets have been in the doldrums for some years—and many businessmen and economists wonder if there is a "future for futures".

It's a matter of concern to all the world's manufacturers who use raw materials traded on the exchanges. Futures offer them price and inventory protection that is unavailable from any other source. And the exchanges are a mecca for speculative investors who are willing to bet they can predict price movements.

What is a commodity futures contract? It is simply an agreement that requires delivery of a stated amount of some raw material in a stated delivery month.

For instance, on July 2 ABC Mills could have bought—through a broker with a seat on a U.S. commodity futures exchange—cotton for delivery next May for 35.49¢ per pound. The contract would be legally binding.

But if ABC Mills doesn't want actual delivery of the cotton—any of several grades could be delivered—it could buy an equal number of May futures in an "offsetting" transaction.

Why are futures markets in trouble? It's partly the result of world conditions over the past decade. Trade has been disrupted, foreign exchange tight. Governments have been doing a lot of buying, selling, and price-setting—and, in many cases, commodity surpluses have been kept off the free market.

But what it all adds up to is this: Markets are dull because there has been less need for them. The experts worry more about the proper use of futures markets than they do about their future.

Futures markets fail if they serve no real need, or if the commodity does not appeal to speculative interest. Many have failed—including crude oil, silk, scrap metal, live hogs.

Other exchanges hang on; some mainly because of what one broker calls "a sentimental reluctance to close the books." In the first six months of this year, for example, total contracts in burlap futures traded in the U.S. totaled only 280; tin, barely 250; tallow and platinum, under 50 each—as compared to 72,350 in potatoes, 39,300 in cotton seed oil, 37,800 in cocoa.

Rubber futures are succumbing to the advent of synthetic rubber. And cotton futures are being severely cramped by the U.S.A.'s surplus sales overseas.

Metals have shown little pickup since the war, but there is little cause for sadness, commodity experts say. They point out that metals futures have never been really healthy, for a good reason. Metal processors have a relatively small raw materials cost, an extremely high labor factor. So there is just not the same critical need for protecting inventories as there is for commodities such as coffee beans and oil for margarine. About 87% of the "factory-door" cost of packaged coffee is for raw materials; for margarine, nearly 90%. For these processors, the need for protection is great.

To understand futures, take a look at the mechanics of a hedge. The theory is simple. When a manufacturer buys a commodity, he simply sells an equal amount in the futures market. Then when he sells his finished goods, he buys back the futures contract. Any loss on one transaction is offset by a gain on the other. The processor makes his money on value added by processing.

Hedging, however, does not offer complete protection. For one thing, futures contracts are based on a standard grade, and the price movement for this grade is not necessarily the same as for the grade used by the processor.

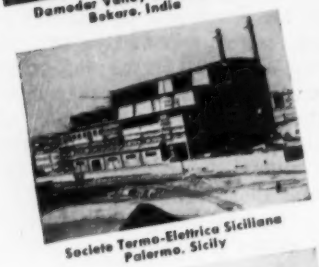
But the real point is that hedging can seldom be a mechanical operation for manufacturers—as it can be for cotton or grain merchants. Competition, especially in a fast-changing, highly competitive consumer market, can kill the processor who doesn't understand the proper use of hedging.

In general, the processor will hedge when prices are high—the current heavy activity in sugar futures is an example. As prices decline, he will continue to hedge his inventory, and/or maintain a low inventory. When prices are low or rising, he can maintain a high inventory and do little hedging—the current slack activity in coffee futures is a good example.

Low volume and a small amount of "open interest" (the total number of outstanding contracts) means the market lacks liquidity. The result, as recently described by *The Economist:* ". . . Markets are thin because too few

Damodar Valley Corporation
Bokaro, India

La Electricidad de Maracay
Maracay, Venezuela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C. A. Electricidad de Caracas
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BRANCH OFFICES THROUGHOUT THE WORLD

traders use them, and more traders will not use them because they are thin."

A thin market is hard on speculators, who are interested in only two things: liquidity and the course of prices. Speculators provide the vital function of broadening the market.

Another strong market factor is that speculators prefer to trade in commodities with a complicated economics—that is one reason grain futures are so active. (Note, however, that British markets are weak because of government grain trading.) The uncertainties of predicting the weather, crop estimates, and consumer demand, plus the basic need for hedging by processors, make grain the king of the futures markets.

Any businessman or investor seriously interested in becoming a speculator has to first master complicated economic factors. Brokers strongly warn there is no room in the market place for the uninformed speculator. And there are complicated technical market matters to consider.

Beyond ignorance, brokers say the most common mistakes made by traders are: 1) trading in too large amounts; 2) taking small profits on a rising market, but "holding on" in a falling market hoping for an upturn; 3) acting on "hot tips"; 4) over-trading—trying to play daily fluctuations in prices; and 5) overconfidence after a few successful trades.

A reputable broker can supply much of the basic market information need by a trader.

The most active futures markets in the world these days are in New York and Chicago. And most of the brokers with exchange seats have overseas customers. Trading is usually via cable.

As for the "future of futures", the hedging needs of commodity growers, dealers, and processors are paramount. Several exchanges are trying to make themselves more useful by bringing contract grades more in line with actual needs—wool tops, tin, and coffee are recent examples. And if processors make greater use of futures as inventory protection, and to establish delivery prices, there will always be speculators around to broaden a liquid market. ●

▶ FINANCIAL DIGEST

Interest in Latin American investments drew them together. As young New York acquaintances working in finance and related fields, they often exchanged ideas on the potential of Latin American business.

Now when they get together, it is as stockholders of a new $100,000 investment corporation called Fomento Panamericano—formed, in the words of President John Stookey, "to create a medium for direct participation in the expanding economies of Central and South America." Fomento also offers its stockholders the opportunity to learn more about the "mechanisms of investment."

The portfolio will be kept well diversified. Fomento will invest in a variety of "reasonably new" companies in a growth stage. And a certain percentage of capital will be kept in liquid, high-yield loans.

Fomento is a sign of the times—and proof that private capital searches out investment opportunities in dynamic economies. Latin American businessmen may well be interested in Fomento as an investment opportunity itself, as well as a possible source of capital.

●

If you think loan money is costly and hard to find in your country, look at the plight of the Bolivian businessman. In La Paz, the prime bank interest rate is 16%—and there is another 9% in taxes and other charges to be paid.

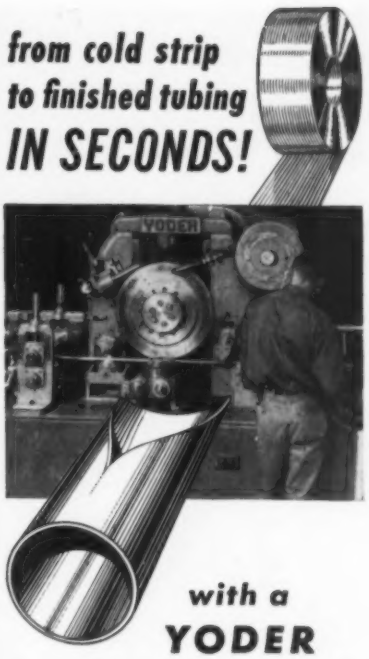
Even in the U.S.A., the Treasury in July had to pay 4% for one-year money. That was equal to the prime rate at the time, and the highest in two decades.

Everywhere, loan funds are scarce and interest rates high. Money is costly because more people want to borrow. And, most important, many governments are keeping money "tight" and credit expensive in order to damp down inflation (see page 7).

Look at the table of prime bank rates below, compiled recently by the First National City Bank of New York. The prime rate, remember, is quoted only to businesses with the very highest credit rating. Many pay more.

Bolivia	16%	Iraq	6–7%
Korea	12–15	Singapore	6–7
Chile	12–14	Spain	6–6½
Greece	12	Colombia	6
Brazil	12	Domin. Rep.	6
Israel	11	El Salvador	6
Peru	11	Guatemala	6
Ecuador	10	Liberia	6
Austria	9½	South Africa	6
Mexico	9½	Venezuela	6
Germany	9	India	5½–6½
Japan	9	Egypt	5½–6
Finland	8–8½	Hong Kong	5½–6
Argentina	8	Australia	5½
Uruguay	8	Canada	5½
Iran	7½–8½	Netherlands	5½
Italy	7½	Great Britain	5½–5½
Turkey	7–9	Philippines	5–7
Denmark	7–8	Belgium	5–5½
Syria	7–8	Portugal	5–5½
Costa Rica	7	Cuba	5
France	7	New Zealand	5
Honduras	7	Panama	5
Lebanon	7	Norway	4½
Nicaragua	7	Switzerland	4½
Sweden	6½–7	Puerto Rico	4½
Ireland	6½	United States	4

from cold strip to finished tubing ***IN SECONDS!***



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One of the fastest . . . and one of the least expensive . . . methods of making steel tubing is with a Yoder Electric-Weld Tube Mill. The Yoder method eliminates the need for time-consuming heat treatments and costly conditioning furnaces for most tube needs. Scrap losses, too, are far lower than any other method . . . usually less than 2%.

The Yoder Type-M Mill shown above is operated by one man and a helper. Coiled strip on this mill is continuously cold-roll formed, welded and cut to required lengths in a matter of seconds . . . at speeds up to 340 f.p.m. The quality of the resulting tube is *constantly* better than the requirements of commercial standards. This is one of many reasons why manufacturers and users of tubing the world over are using more Yoder mills than all other makes combined.

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In the U.S.A. recently, the president of the world's largest exclusive truck-leasing firm added 1000 new Chrysler Corporation trucks to his fleet.

The reason for his choice was simple: "*We picked these Chrysler Corporation trucks to give our truck-lease customers the finest hauling and delivery operation at lowest cost*".

You'll be ahead also when you choose Dodge, De Soto or Fargo trucks—whether your order is for one or 1000.

Powerful new V-8 engines bring you outstanding performance for your toughest jobs —with less engine strain and fewer repair bills. And you'll be able to haul *bigger loads*, thanks to higher Gross Vehicle Weights and the elimination of "dead" chassis weight.

These advances, along with the very finest in styling, safety and driver convenience are yours in every Chrysler-made truck.

See your Dodge, De Soto or Fargo dealer soon. Discover how you can be among those already enjoying the finest truck performance at lowest cost per mile.

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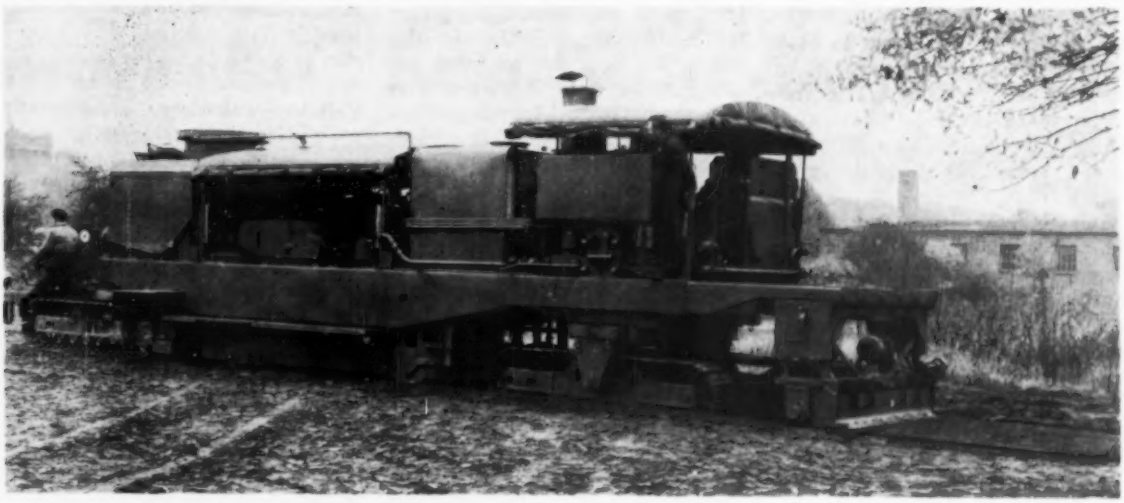

Tractor and stabilizing mixer together make up this . . .

One-Pass Road-Laying Machine

Digested from ENGINEERING NEWS-RECORD, June 27, p81; CONSTRUCTION METHODS AND EQUIPMENT, August, p187

A new road-laying machine called the "Sawoe" has been developed in Germany. A combination of excavator, mixer, and paver, it comes probably as close as anything to a road-builder's "dream" tool.

The machine produces 656 to 985 feet of concrete or asphalt-treated secondary road per hour in one working operation, using existing soils as aggregate. It is tractor-driven, and moves on articulated tracks while grippers break the ground in front of it to a depth of 12 inches. The soil is then lifted into the machine where it is broken up, mixed with water and cement (or asphalt), and distributed as a road behind the machine. It can lay roadways up to 8 feet 3 inches in width and requires the service of only two operators.

Two parts—the soil stabilization mixer and the towing tractor—make up the machine. They can be disconnected and used separately.

The main frame of the machine is a lightweight welded steel structure. It is designed to mount either the tracks required for site work or the sprung axles fitted with pneumatic tires on which the machine moves on the highway.

To enable the chassis, the mixing hopper, and the rear caterpillar tracks to be repositioned for working or for transportation, three separate hydraulic units are used. They include one that adjusts the height of the mixing hopper relative to the main chassis; one that raises the whole machine for changing the tracks; and a hydraulic steering system.

Power for the mixer comes from an 8-cylinder air-cooled diesel engine—which also drives a generator. This generator supplies power to the electric motors driving pumps placed a short distance away from the engine. The tractor is powered by a 2-cylinder air-cooled diesel engine.

While working, the mixer forms a semi-trailer supported on the tractor. Its working shafts are supported on two sets of articulated tracks, so that irregularties in the road bed are transmitted to the shafts in reduced form and a level surface is obtained. The two tracks form ends of a "carriage" 26 feet 8 inches in length.

The mixer carries the three working shafts in fully enclosed, dust-proof bearings: The first shaft is a high-speed cutter shaft capable of breaking up small stones. The two following shafts, which conform to those in a twin-shaft mixer, mix the material that has been loosened by the cutter to make it completely homogeneous.

The hopper has provisions for supplying water, and bituminous or cement binder. For bitumens, two sets of spray nozzles are provided. The amount of binder added can be accurately adjusted by means of precision measuring instruments.

The binder is drawn through hoses from a truck running beside the mixer and is sucked into the spraying pipe by a pump (maximum capacity of 65 gallons per minute) mounted on a mixing hopper. The water required is supplied by a second pump having a capacity of 110 gallons per minute which delivers into a second, wide-spray sprinkler unit. For cement stabilization, the water also is supplied by the water pump.

Before putting the rig to use, the contractor has to make an accurate analysis of the soil to determine the most suitable additives that can be used. Then the roadbed is excavated to grade, the required aggregates are placed, and the Sawoe goes to work. It operates at a speedy 6 to 52½ feet per

minute. The normal width of a single pass of the machine is 6 feet 7 inches; the maximum working width 8 feet 3 inches. In both cases the caterpillar tracks run on the road bed, the front tracks riding over the soil to be treated while the back tracks are adjusted to suit the width of the layer to be stabilized.

During stabilizing operations, the tractor driver steers the machine by sighting on carefully located surveyor's poles which are removed just as the tractor reaches them.

When stabilizing a strip next to an existing strip, the driver can, from his low position on the tractor, make sure that the new strip butts directly against the existing one.

No shunting or turning of the machine is required. At the end of each strip the mixing hopper is raised hydraulically and the machine moved clear to one side. Then the rig simply backs up to return to the starting position and is ready to lay the next strip.

For this operation the tractor is locked in the straight-ahead position. The operator standing on the rear of the machine controls it by means of the rear crawler tracks, which then become the leading tracks and can be steered. **Edward Linnhoff, Berlin-Templehof, Germany.**

Versatile New Optical Comparator

The "Shadomaster Junior" optically compares the shape of a workpiece with a master drawing. It has been redesigned to work in both horizontal and vertical positions—a versatility which the manufacturer claims has been achieved at a modest price without loss of quality. The provision of gage lenses and a specially worked mirror, together with the precision collimation system, make the machine suitable for repetitive inspection on a production line.

In the horizontal position, with a focusing stage fitted, the table measures 6x4 inches and there is a distance of 3¼ inches from the top of the table to the optical axis. When the optical axis is vertical, a 6-inch square table with a glass insert is available upon which workpieces may be laid for projection. A coordinate workstage for horizontal projection is also provided. Both these accessories can only be used in conjunction with the horizontal focusing stage.

Illumination is given by a high-intensity projection lamp operating at low voltage from a built-in transformer with double-pole switch in main circuit. Colored filters can be had if the comparator is to be used for long periods of inspection. **Watson, Manasty & Co. Ltd., 139 Richmond Road, Kingston-on-Thames, Surrey, England.**

Printing calculator — Automatic multiplication, total transfer, decimal selection, direct subtraction, and automatic credit balance are among the features of a new ten-key printing calculator. **(Clary Corp., San Gabriel, California, U. S. A.)**

U. S. Autos: What They Look Like for '58

Beside the sweeping changes in the American automobiles of 1957, most of 1958's may not seem sensational—at first glance, at any rate. But according to the experts in Detroit, some of the features of next year's cars may herald major innovations for the entire auto industry.

Restyling has become an expensive annual necessity. Secrets about new designs are by now pretty much open ones, the chief being that of Chevrolet's drastic restyling. The '58 Chevrolet model will be curvacious, with gently rolling rear fender and trunk—a silhouette that contrasts with Ford's sharp lines and Chrysler's "flying wedge" design.

Chevy's changes have forced Ford to make an extreme "restyling" effort, if not a complete model change. Standard Ford automobiles will have their grilles and bumpers redesigned, as well as the trim along the sides. Rear lights will be flat and oval, and both these and headlamps will be placed two to each side.

The apathy of buyers to 1957's expensively-redesigned Buick and Oldsmobile, along with slower sales in the medium-priced range, is causing General Motors to rush changes in these models' styling. And Cadillac is said to have more changes than originally planned because of Lincoln's "new look" and the rise of the Chrysler Imperial.

Studebaker-Packard's Scotsman and Hawk will continue to be promoted during 1958—the first as the "least expensive" American car. The popular Hawk line combines the racy lines and high power of foreign sports cars with space for five passengers.

Very significant as a pointer to changing public taste in America is the reintroduction by American Motors of the small Rambler car. With an overall length of roughly 185 inches, it will be the smallest American-made car on the market, joining the growing fleet of small foreign economy cars on U.S. highways (MD, Aug., p14).

The launching of a new automobile—Ford's Edsel series—will be one of the highlights of the industry's year, beginning this month. The new car has been described as "disappointing", though, and hardly as revolutionary as the manufacturers claimed. Commentators find that Edsel has many points in common with the 1957 Mercury Turnpike cruiser model. Its chief departure from conventional design is in its grille, which has a vertical shield-like shape and is very high. It will join Dodge, Pontiac, and some Buicks in the highly competitive low-medium price range.

Below-the-surface changes in 1958's cars may not appear sensational but they are important: One-piece bodies, pioneered by American Motors, will be used with Lincoln and may ultimately be adopted by the whole industry. Air suspension systems and torsion-bar suspension will be featured widely. Powered brakes will be extended to entire lines.

LINK-BELT offers one source for a broad range of materials handling equipment

ALL TYPES OF CONVEYORS — Belt, oscillating, apron, slat, screw and chain types for any materials handling operation. Complete range of sizes and wide selection of accessories permit economical adaption to specific requirements.

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Whether you want to replace a single drive or install an entirely new system, Link-Belt can supply the exact type and size for your requirements. And you get far more than just equipment! Link-Belt offers one proven source . . . one responsibility . . . for over-all planning . . . design . . . manufacture . . . and erection if desired.

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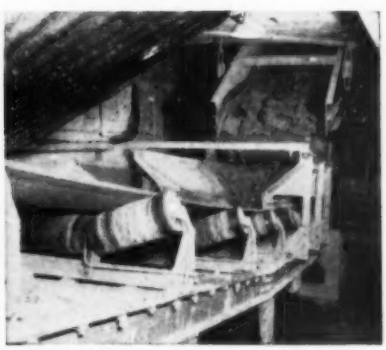
VIBRATING SCREENS in standard models for fine, medium and heavy-duty sizing as well as for scalping, dewatering and rinsing.

BUCKET ELEVATORS in 13 vertical, inclined and digging types in 4 basic designs. Assure continuous flow of materials.



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In a large office, the "Secretary" Brand Copying Machine is an invaluable aid to the stenographic department . . . in a small office, it may *be* the stenographic department. This amazing desk-top copying machine makes perfect copies in just four seconds. It requires no chemicals, liquids or acids—pays for itself in time saved making accurate, dry copies. Find out how the "Secretary" and "Thermo-Fax" Brand Copying Paper can save time and cut costs in your office. For full information or for the name of your nearest supplier write Minnesota Mining and Manufacturing Co., International Division, 900 Bush Avenue, St. Paul 6, Minnesota, U.S.A.

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PROFESSIONAL MEN, like lawyers, doctors, ministers, get quick clean copies of letters, contracts, legal documents, ledger pages and other business forms with the "Secretary".

EXECUTIVES use the "Secretary" when they need fast, accurate copies of meeting notes, work sheets, financial statements, budgets, etc. Only 4 seconds from original to error-free copy!

SMALL BUSINESS firms find the "Secretary" pays for itself in copying time saved on contracts, order forms, purchasing agreements, letters, invoices, and other important business papers.

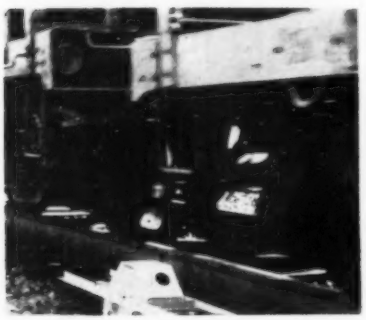
3M

Made in U.S.A. by MINNESOTA MINING AND MFG. CO., International Division, St. Paul 6, Minnesota. Other plants in Austria, England, France and Germany.

Clean Floors for Industry

Two new floor cleaning and drying machines will help with the housekeeping in factories and offices. The first, called the "Mallard", is a lightweight scrubber and polisher built for easy manipulation over a large floor space, in narrow areas, or even up and down stairs. It is fitted with a dual rotating-brush mechanism to remove dust and dirt from uneven surfaces. When the machine is needed for polishing only, the tank containing the detergent can be removed; when fitted with a special detergent, it can be used for carpet shampooing.

A "Dipper" suction floor drier is available for use in conjunction with the cleaner. Made in two capacities of 2½ and 4½ gallons, the drier is fitted with a suction unit which enables it to draw up dirty water rapidly from both even and rough surfaces. **Cimex-Fraser Tuson Ltd., Orpington, Kent, England.**



"Hot Box" Detective

When the journal box of a passing train is overheated, the heat can be picked up by a pyrometer mounted against the track (see above), then amplified, transmitted to a signal case, and recorded. This device, part of a new "Servosafe" system, enables railroads to spot "hot boxes" before they can cause damage, and outmodes the old method of detection by sight and smell. The system is presently being used on a number of railroads in the United States.

The pyrometer, which is placed at an angle of 40° on the gage side

Here it is! The superlative ROYAL STANDARD

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The all-new Royal Standard is the greatest advance in typewriters in years . . . and it gives the quickest, slickest typing you've ever seen!

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Please send me the complete story on ☐ RCA 400 Senior and Junior Sound Film Projector; ☐ RCA Magnetic Recorder-Projector; ☐ RCA Mobile Trailer Projectors; ☐ Porto-Arc Projectors; ☐ RCA Tape Recorders.

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That's why important companies around the world rely on RCA 16-MM Projectors for visual training programs as well as sales presentations. Choose the lightweight, single-case 400 Junior; the dual-case 400 Senior with extra-powerful speaker; the 400 Magnetic Sound Recorder-Projector, which records and reproduces easily and economically; or the high power Porto-Arc, for projection in larger auditoriums. Each of these convenient, portable models is a long performing Projector of dependable RCA quality.

For educational purposes "on the road", RCA also has mobile trailer projector units complete with generator. Contact your distributor for helpful literature and specialized advice on RCA Projectors and on RCA's wide line of tape recorders. Or send above coupon today for brochure and your distributor's name.

RCA INTERNATIONAL DIVISION
RADIO CORPORATION OF AMERICA
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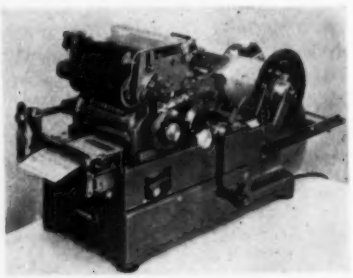
TRADEMARK(S) REGISTERED

MORE PRODUCT DIGEST

of the rail, "views" passing journal boxes through a specially designed infrared lens. It is protected from dirt and weather by a metal case with a circular opening 2½ inches in diameter over the lens. The opening is covered by a metal disc which opens automatically at the approach of a train.

At the recording office, the relative temperature of every journal box of a passing train is automatically charted by machine on graph paper. A box at normal temperature makes a graph trace about 2 to 3 millimeters high; a box hot enough to cause trouble makes a trace 15 to 20 millimeters high. This warns a dispatcher to stop the train and order the car with the troublesome journal to be pulled out of service. **Servo Corporation of America, New Hyde Park, New York, U. S. A.**



Prints Tags, Labels

Manufacturers whose labels or tags must have special identifications (size, quantity, classification, trade name) can now print their own at 120 per minute, according to the makers of this new machine. "Wam" printing units will imprint on cloth, pressure-sensitive material, gum labels, string and button tags, etc. in sizes from 1 inch by ½ inch up to 4¾ inches by 6¼ inches. Each model is designed to run in variable sizes, and special cylinders are available for the particular needs of different manufacturers. Features of the machine include: consecutive numbering units; automatic label rewinders or cutters; two color printing; up to 23 lines of imprinting on each tag.

Both automatic and manual models are available of the Wam

machine, which occupies half the space of a standard typewriter. **Maschinenbau Wam, Berlin-Spandau, Germany.**

Power Screwdriver Uses Cartridge Loads

A completely automatic power screwdriver has been developed which drives screws at any angle as fast as the operator can pull the trigger. Weight is only 6½ pounds.

Each screw is automatically fed into the driving jaws and held tightly in place until started into the work piece.

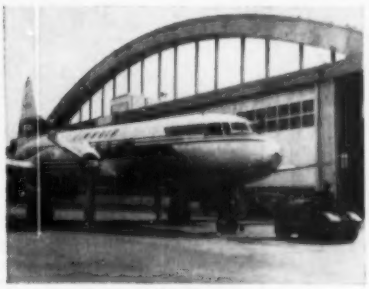
The screw supply is always visible and is quickly replenished by replacing the screw cartridge. An accessory electric hopper reloads cartridges automatically. The cartridge holds 60 No. 8 screws and slightly less of No. 10 in lengths of ⅞ to 1½ inches, and almost all types of heads. **Illinois Tool Works, Shakeproof Division, St. Charles Road, Elgin, Illinois, U.S.A.**

All-Steel Jeep Cab

With a Kemco Cab, any standard jeep—1952 models onwards—can be converted into a steel-enclosed vehicle. The cab bodies are made of cold rolled 18-gage steel and are welded, fitted, and assembled in the factory. They are delivered with the exterior primed and ready for final painting. The windows,

CLARK EQUIPMENT
moves mountains . . .

. . . of unrefined bulk sugar In the warehouse of a Puerto Rico sugar company, this big MICHIGAN Tractor Shovel speeds enormous tonnages to the refineries. Note the heaping bucket load of sugar—a graphic demonstration of how a MICHIGAN reduces handling costs by moving big loads quickly and easily.



. . . aeroplanes
To airline travelers all over the world, CLARK towing tractors are a familiar sight. These fast-moving "buggies" hustle baggage, food, mail—even move 4-engine aeroplanes.

. . . bottled goods
This CLARK fork-lift truck, by high-tiering cases inside this Johannesburg (South Africa) warehouse, has increased storage capacity 50 per cent.

. . . underwater sand
A MICHIGAN dragline (right) reaches underwater to excavate heavy loads of sand. Material is quickly leveled along the bank by the MICHIGAN Tractor Shovel.

. . . muddy overburden
The 30 mph speed of this MICHIGAN Tractor Dozer enables it to do more work than three 5 mph crawlers formerly used here, with less than one-fifth the repair costs.

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Typical of CHAIN Belt Company's ability to quicken the pace of progress in all industry, these truck mixers enable the owner to make more trips per truck per day... substantially reduce his operating and maintenance costs. CHAIN Belt pioneered and developed virtually all the features of truck mixer design... remains years ahead of the field in features that make greater profit for users.

Your local CHAIN Belt Distributors will be pleased to give you complete information on Rex Truck Mixers, Pumps, Building Mixers, Pavers, Pumpcrete, Railporter, Road Finishers, Floats, Curing Machines—Road and Airport, Curb and Gutter Forms. Remember, CHAIN Belt also makes the quality Rex line of chains, sprockets, bearings, bulk handling conveyors, and water and waste treatment equipment.

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which are fitted with safety glass, are permanently sealed with liquid latex and bonded with rubber channel.

Two kinds of cab are available: the Kemco DeLuxe Cab, and the Custom Cab, which has a larger glass area. **Singer Products Company Inc., Sin Par Automotive Division, 15 Moore Street, New York 4, New York, U. S. A.**

Bookkeeping Machine Features Magnetic Coding

A new high-speed bank bookkeeping machine combines electromechanical and electronic principles. Called the Sensitronic, the compact new machine uses electronic components and magnetic code stripes to perform most position operations without assistance from an operator.

In typical operation, the operator inserts a statement form in the machine with one hand, simultaneously entering the account number and amount of the item, and depressing the appropriate motor bar with the other hand.

All other operations—form alignment, posting line selection, account verification, old balance pickup, column selection, computing of new balance and aggregate check count, printing of date, balances and count—are performed automatically. At the same time, the Sensitronic automatically enters the appropriate new information on the magnetic code stripes and ejects the form, readying the machine for the next

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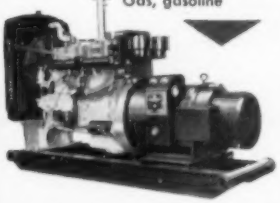

A superb line of Enginators— backed by over 50 years' experience in building heavy-duty engines and electrical equipment. For reliable performance on all fuels, these accurately balanced Waukesha engine-generator combination units supply smooth, steady power in continuous, intermittent and standby service.

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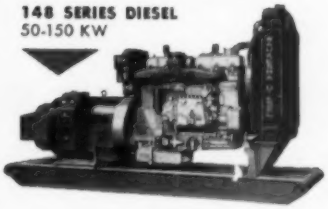
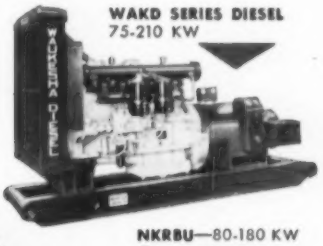
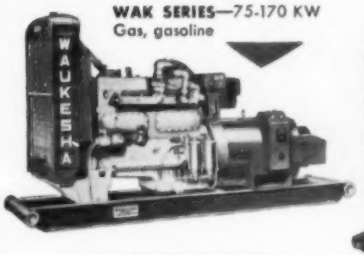


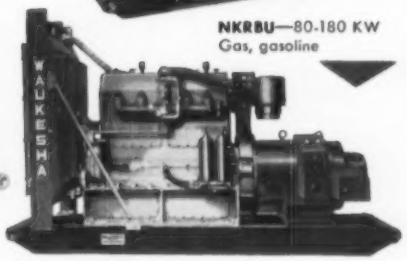
WAKD SERIES DIESEL
75-210 KW



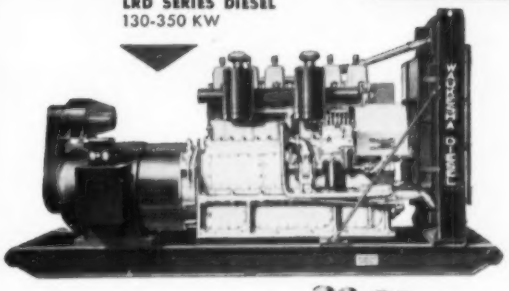
WAK SERIES—75-170 KW
Gas, gasoline



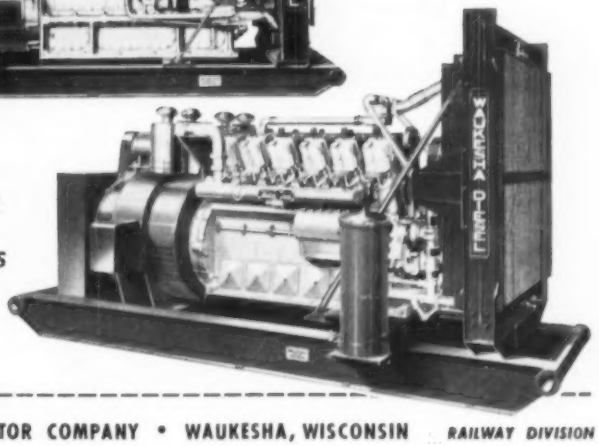
NKRBU—80-180 KW
Gas, gasoline



LRD SERIES DIESEL
130-350 KW



VLR SERIES—250-730 KW
LPG, natural gas, Diesel



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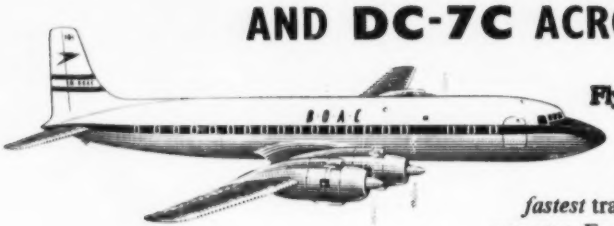
AND DC-7C ACROSS THE ATLANTIC



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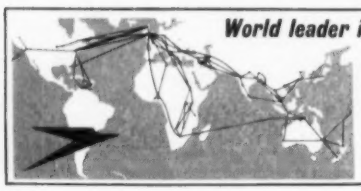

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processing operation. **Burroughs Corp., 6071 Second Ave., Detroit 32, Michigan, U.S.A.**

New Movie Camera Sets Own Exposure

The energy from solar or light rays has been harnessed to set the lens of a new automatic 8-millimeter movie camera which has just been introduced into the U. S. market. The new movie camera, said to be the first in which light energy alone supplies the power to generate the electric current which adjusts the lens, is also the first entirely automatic one in this size.

The camera operator merely winds the camera, sights, and shoots. The photoelectric eye, which adjusts to changing light faster than the human eye, sets the lens for proper exposure before the starting button is touched. It can operate the lens through its full range of stops from f/1.9 to f/16 in less than a second. No focusing is necessary and the camera can be used with indoor or outdoor color film. The camera can also be operated manually; a simple dial sets the type of lens control desired.

Both wide angle and telephoto attachments are available as accessories. Operation of the camera is fully automatic with either attachment. Retail price in the U.S.A. is $169.95. **Bell & Howell Co., 7100 McCormick Road, Chicago 45, Illinois, U.S.A.**

Portable Nut Feeder

A new portable nut feeder consists of a standard electric vibratory parts feeder, and escapement mechanism, a plastic hose through which the nuts are propelled by compressed air into a "driving head," and the "driving head" which can be attached to any pneumatic or electric nut runner. The actual orientation of nuts occurs in the driving head proper.

The driving gun with the attached driving head is held in the hand and connected to the feeder mechanism by flexible

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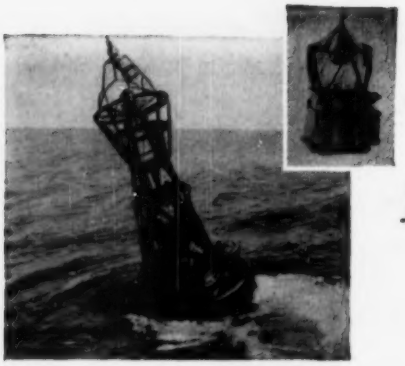
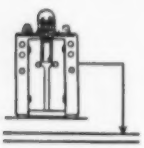


Where Performance Counts

WALLACE & TIERNAN EQUIPMENT IS USED

AIDS TO NAVIGATION

A W&T Buoy equipped with an electrically powered beacon, automatic lamp changer, flasher unit, and radio control equipment is shown above in service at a harbor entrance. Wallace & Tiernan equipment was chosen because of its dependability and economical operation. These qualities are typical of all W&T's navigational aids which include such items as lamp changers, flasher mechanisms, signal timers, fog horns, aircraft flasher units, and other related apparatus.



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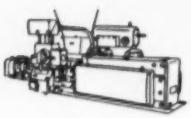
Equipment includes chlorinators of both the water and mechanical diaphragm types in all capacities, hypochlorinators, and many other auxiliary and accessory items designed for use in the treatment of water for sanitation as well as for numerous industrial purposes.



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Equipment includes chemical solution feeders, gravimetric and volumetric dry feeders, and gravimetric meters for use in the chemical, grain, and food processing industries.

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Equipment includes a complete line of aneroid and mercurial pressure sensitive instruments, such as altimeters, barometers, and manometers designed for use in industrial testing as well as for research purposes.

Other quality Wallace & Tiernan products and services used throughout the world are listed below. For further information send for list number F-105 of available free technical publications on all Wallace & Tiernan products.

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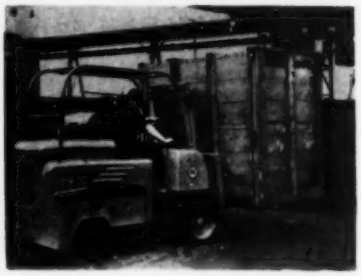
REPRESENTED IN MOST COUNTRIES

F-105

hoses. The nuts can be driven any place in the area of the 10-foot radius from the feeder mechanism. **Pneuma-Serve, Ltd., 42 Queen Elizabeth Blvd., Toronto 14, Ontario, Canada.**



Heavy-Duty Lift Truck

This 10,000-pound capacity truck is built for materials handling in mill, factory, and warehouse. It has a welded frame, a fork-mounting carriage of the standard shaft type, and 230-cubic-inch engines—available in diesel, gasoline or liquefied petroleum gas models. The roller type mast is designed to reach three standard heights.

The truck is equipped with a 2-speed, constant mesh transmission; power shift transmission; power steering, and a No-Spin Differential. **Allis-Chalmers Manufacturing Co., Tractor Group, Milwaukee, Wisconsin, U. S. A.**

Motorless Automatic Pump

Motivated by water power, and using a water hammer and air lift system, a new pump will lift water automatically up to required heights. The unit requires neither motor, engine, nor electric power; it needs no fuel or lubrication, no operating manpower or maintenance personnel, and only a single change of packing once a year. As long as water is supplied continuously, the pump operates.

The "Dyna" pump is available in three capacities, discharging 4.2, 109 and 1,000 liters a minute, with the following leading and discharging pipes—1 inch and one-half inch, 4 inch and 2 inch, and 12 inch and 6 inch, respectively. **Chou Trading Co., No. 11, Kyobashi, Chuo-ku, Tokyo, Japan.**

Plastics from the salt of the earth

WITH THE PAINSTAKING care of expert chefs, scientists combine ingredients from salt and natural gas—cook them in huge pressure cookers called autoclaves—and turn out amazing vinyl plastics.

FIRST TO USE THE RECIPE over 25 years ago, the people of Union Carbide prepare millions of pounds of vinyl plastics each year. They can be blended into materials that ignore scuffing . . . stay young and flexible for years . . . thrive in sunlight or salt water . . . and shrug off liquids known for staining.

AS FLEXIBLE FILM, vinyls become decorative shower curtains, draperies, protective garment bags, or inflatable toys. Vinyls can be squeezed through a hole—like toothpaste from a tube—to make insulation for wire and cable. Other forms produce wear-resistant flooring, durable upholstery, washable playing cards, upbreakable phonograph records. The list grows bigger all the time.

WITH AN EYE TO THE FUTURE, the people of Union Carbide are still pioneering in this fascinating field. The years to come will see more and better plastics serving in every home.

FREE: *Learn how Union Carbide products and research help satisfy basic human needs. Write for the 1957 edition of "Products and Processes." Ask for booklet 1MD-9.*

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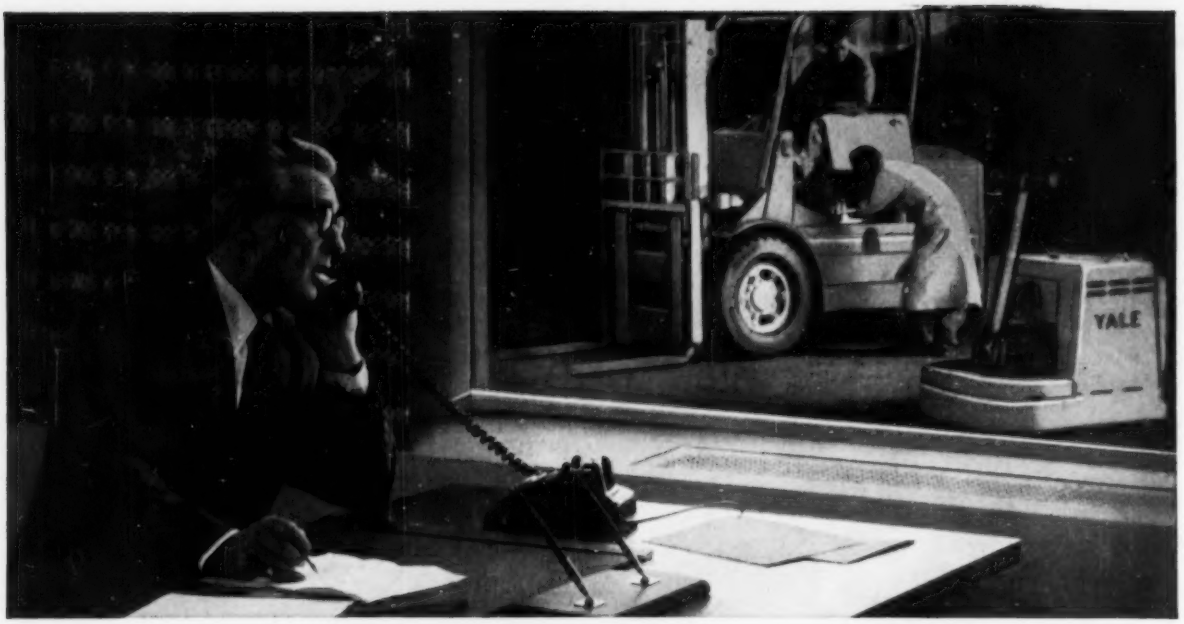

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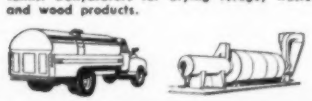

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Vacationing families and active sportsmen can travel on land and water in the "Neptuna", which also has its uses as a mobile office, floating restaurant, freight hauler, and floating doctor's office.

The Neptuna hitches on to any car and travels on the road on two retractable wheels equipped with 8-ply truck tires with puncture-proof tubes. Electric brakes, which are controlled by the driver of the car, are also provided. It is launched by backing into the water after the car has been unhitched and the wheels retracted.

The interior of the boat-cum-trailer has complete kitchen facilities and sleeping accommodation for 4 people. Length is 26 feet, beam width 8 feet. **Singer Products Co., Inc., Sin Par Automotive Division, 15 Moore Street, New York 4, New York, U. S. A.**

Silicone Insulating Resins

Two new solventless silicone insulating resins are identified as R-7501 and R-7521. They are 100% silicone materials, and pour freely without solvents. They are used to form void-free high temperature impregnations or encapsulations for electric or electronic equipment.

The low viscosity and fully reactive nature of the resins enable them to thoroughly saturate and penetrate the most complex assemblies and provide a solid, bubble-free insulation. Cured, they exhibit excellent dielectric properties, moisture resistance, thermal conductivity and mechanical strength despite prolonged exposure to 400° F. or intermittent service at as high as 500° F. **Dow Corning Corp., Midland, Michigan, U.S.A.**

New Radio Paging System

The "Radio Pager", a small, 10-ounce receiver set that can be clipped to a vest pocket, enables a manager or maintenance man to receive a message from any part of his factory or office building.

The device is part of a telephonic system which can be worked by a switchboard operator. The operator dials the appropriate number, causing the Radio Pager to buzz, and the voice message follows. Other receivers remain silent, and the message is heard only by the person paged, even in the presence of electrical devices. For places where the volume of noise is particularly large, special forms of receivers—e.g. of the hearing-aid type—are available. **Motorola Communications & Electronics, Inc., 4501 Augusta Boulevard, Chicago 51, Illinois, U. S. A.**

High-Speed Calculator

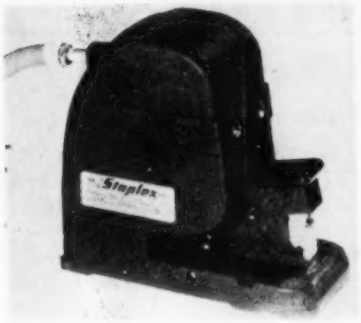
A high-speed automatic calculator has just been introduced which features an automatic constant, a memory, and a rotary printing device. It is called the "Divisumma 24". Not only does the calculator perform the four basic operations of arithmetic—multiplication, division, addition, subtraction—but it also handles them in combined operations without requiring the re-entry of intermediate figures. Capacity of the machine is 12 columns listing and 13 columns total. **Olivetti, Ivrea, Italy.**

Multi-Purpose Crane

This self-propelled machine can be used as crane, shovel, clamshell, drag and hoe. It is mounted on a short-coupled, 96-inch square rubber-tire carrier with 4-wheel drive and requires no outriggers to develop a 7-ton lifting capacity in all positions of turntable swing. The power take-off on the turntable, provided by an automatic transmission and torque converter, gives three travel speeds in both directions up to 15 miles per hour.

Besides 4-wheel drive, hyraulic power steering is possible on either the wheels on one axle, or on all four wheels. In the latter case a 15-foot turning radius is provided; or the wheels may be placed so as to allow the machine to progress sideways.

The independent travel provides for traveling, hoisting, swinging and boom derricking simultaneously, each under separate clutch control. **Thew Shovel Co., Lorain, Ohio, U. S. A.**



Air-Powered Stapler

Bags, material, and paper can be fastened by the Model SA-100 air-powered machine, which can be installed wherever pneumatic lines are in use. The unit is equipped with a 3-way air switch valve for operation by foot, knee or hand. 1¼-inch leg staples are used by the machine, which is portable or can be bench mounted. **Staplex Co., Industrial Division, 777A-134 Fifth Avenue, Brooklyn 32, New York, U. S. A.**

Tractor Drives Pump

New pump model, designed for use in flood irrigation, can be attached to any tractor providing 10 to 25 horsepower at the power take-off shaft. It has a 6-inch suction and 6-inch discharge. Input speeds from tractor to pump should range from 500 to 650 revolutions per minute to give a maximum capacity of 1600 gallons per minute.

The pump is equipped with an extra heavy duty gear box with a ratio of 1:2.79, a hand diaphragm priming system, a pneumatic wheel mount with 4 x 8-inch tires, and a drawbar and adjustable tractor tongue hitch. **Marlow Pumps, Division of Bell & Gossett Co., P. O. Box 200, Midland Park, New Jersey, U. S. A.**

Telephone system—A new 50-line automatic internal telephone system uses dial telephones for the extension stations, each connected to an automatic switchboard. The system has six connecting links, permitting six simultaneous private conversations to be conducted. **Tele-Norm Corp., 55 W. 42nd St., New York 36, New York, U. S. A.**

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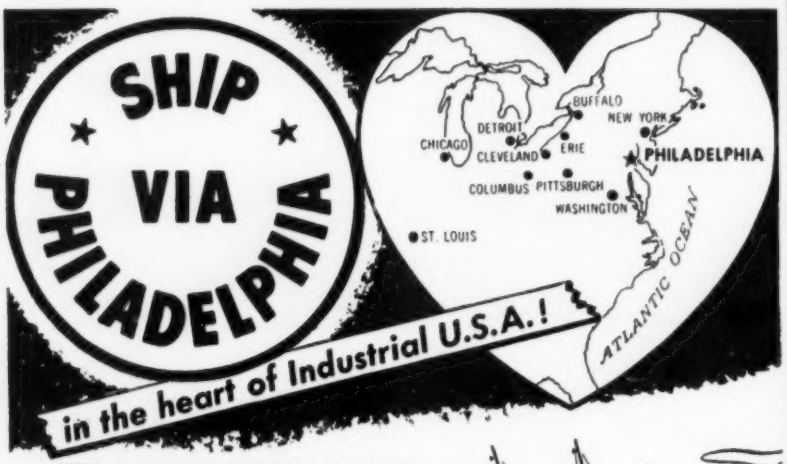

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MORE PRODUCT DIGEST

Typing Keys Select Tabulating Columns

Decimal tabulation is simplified by the use of the bottom row of typing keys to select tabulating columns in a new lightweight typewriter. When the keys are pressed back horizontally, individual stops, indicated on the space bar, are automatically selected, thus aiding random tabulation.

The machine is converted for tabulation by the addition of a simple mechanism at the rear which raises the carriage stop. Decimal calibration on the space bar is the only external difference between this and the manufacturer's standard models. In both, the carriage is 13 inches wide. **Alpina Office Machine Co., Kaufbeuren, Germany.**

Roller Conveyor Reduces Materials Handling Cost

Receiving, assembling, packing, and shipping are a few possible uses for a new roller conveyor for moderate loads. The 1.75-inch diameter roller conveyor is available in aluminum, suitable for wet areas, and ideal for portable use. It is also non-sparking, so it can be used in high explosive zones.

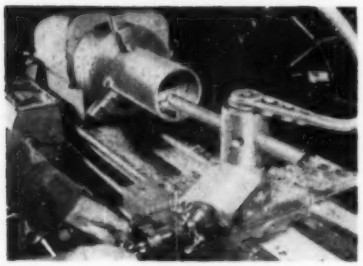
The new roller conveyor connects to Rapistan wheel conveyors and all Rapistan power driven conveyors. **The Rapids-Standard Co., Inc., Grand Rapids 2, Michigan, U.S.A.**

New Packaged Power Unit

The Motomount Syncrogear is designed to meet requirements for operations where a standard motor is mounted separately from the gear unit. A heavy duty motor support provides easy access to the motor mounting and coupling.

Available in a variety of mounting positions, the Motomount Syncrogear comes with double reduction gears in ratios from 7.6:1 to 47:1. Speeds range from 37 to 280 revolutions per minute, horsepower ratings from 1 to 30. **U.S. Electrical Motors Inc., Box 2058, Terminal Annex, Los Angeles 54, California, U.S.A.**

NEW BORING BAR, based on science of harmonics, is built to give bigger cuts at faster speeds.



DEEP CAVITY can be bored by new bar with little or no tool chattering.

INSIDE of bar is tapered to center, filled with shock-absorbing material.

No-Chatter Boring Bar

What is claimed to be the first boring bar based on the science of harmonics has just been developed. The inside of the bar (see sketch) is bored out from both ends to a hole of various diameters, with the smallest diameter at the center of the bar. This shape helps to bring harmonic vibration to a minimum. The cavity is filled with a shock-absorbing material, under vacuum. A special alloy metal combines to give bigger cuts at faster lathe and boring mill speeds.

Quarter-inch graduations on the outside of the bar (see top picture) enable the operator to see the depth of the bore without measuring. **Pensco Products, 527 Lexington Avenue, New York, New York, U. S. A.**

Electronic Device "Sniffs out" Leaks

The M-2 mass spectrometer leak detector is designed to locate leaks in vacuum or pressure systems such as electronic tubes, tanks, boilers, and piping. This is the method used: The work to be tested is evacuated and connected to the leak detector. A small spray of tracer gas, usually helium, is then sprayed on the surfaces of the material to be tested. If a leak is present the detector locates it and indicates it either on the operator's control panel or by means of an audible alarm. **International General Electric Co., 150 East 42nd Street, New York, New York, U. S. A.**

Gear-Less Hydraulic Truck

The new German "Hydrocar" industrial truck has an infinitely variable transmission operated by hydraulic pumps. With a 2-ton load capacity and 6-brake horsepower diesel engine, the forward speed, braking, and reverse can be controlled with a single lever.

The 438 cubic centimeter single cylinder engine is mounted on the front end of a tubular backbone chassis and drives an enclosed axial piston pump. High pressure oil is piped through the hollow chassis to individual pumps on the two trailing members supporting the rear wheels.

Drawbar pull of the Hydrocar is 20 tons, while the maximum speed is 9 miles per hour in both forward and reverse. **Guldner Motoren Werke, Aschaffenburg, Germany.**

Water heater—Unit will raise from one to 10 pints of water to an adjustable temperature of 95° F. to 212° F. The appliance is bracketed to the wall and is switched off automatically at the desired temperature. **Allgemeine Elektricitats-Gesellschaft, West Berlin, Germany.**

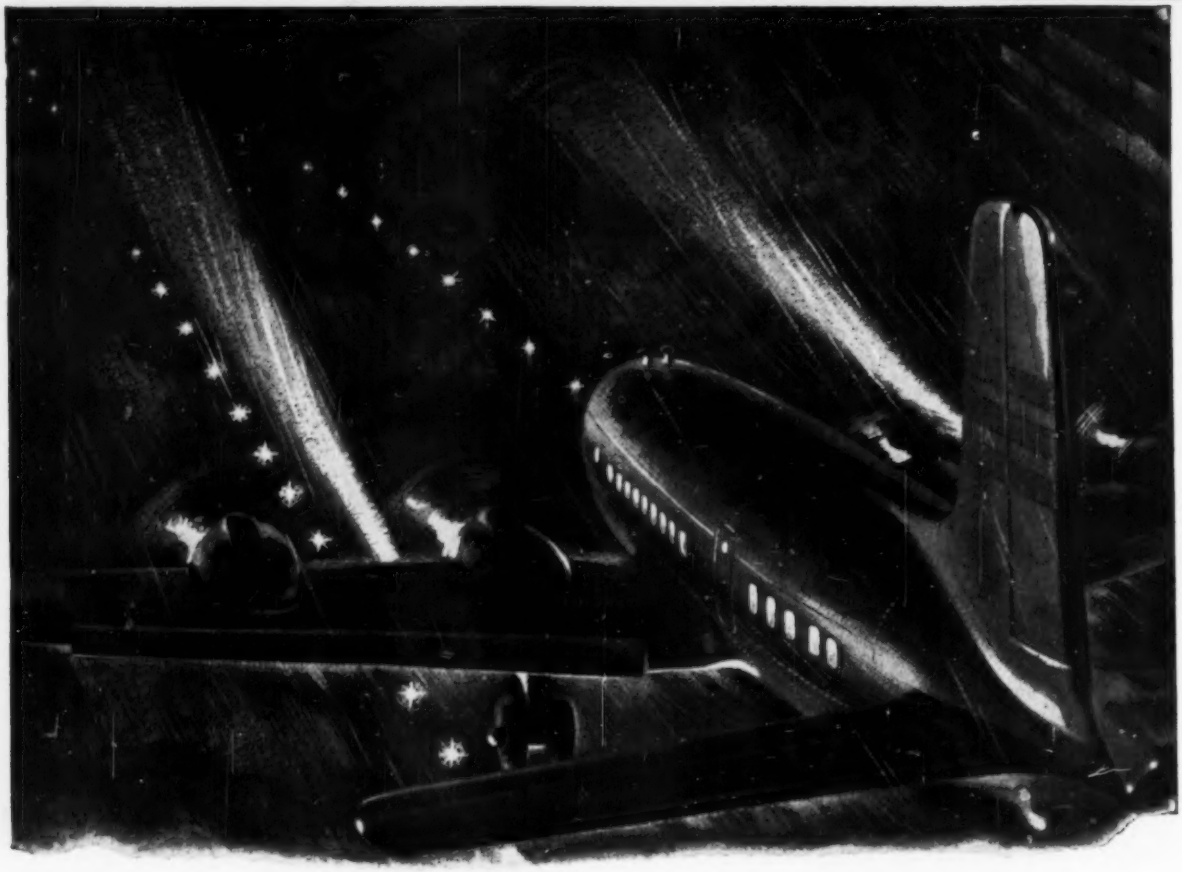
Off-the-Road Fork Truck

The "Ranger 150" fork truck, a pneumatic-tire model for off-the-road handling, has a 15,000 pound capacity and a top speed of 25 miles per hour in both forward and reverse.

Its four-wheel drive, power steering, power shifting, and oscillating rear axle suit it to work in heavy mud or over rough terrain, according to the manufacturer.

Four- or two-wheel drive is obtained by the manipulation of a selector lever. The power train combines a torque converter with 3-to-1 multiplication with a four-speed, power shift transmission.

A 95 net brake horsepower gas engine and 102 net brake horsepower diesel engine are both available. **Industrial Truck Division, Clark Equipment Company, Battle Creek, Michigan, U.S.A.**



No Place For Error...

Pin-point landings in thick fog or stormy night are routine as gyroscope "pilots", using high speed rotors of Mallory 1000 Metal, hold airliners on course with superhuman precision.

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Mallory electronic components and a man-made powdered metal—Mallory 1000—have a lot to do with this "operation safe flying."

Mallory 1000 is used in the whirling rotor rings of the gyroscopes that provide a stable horizon essential to precise guidance by flight instruments and controls. The great weight of high density Mallory 1000 gives vital increased stability within the limited space allotted to gyro equipment.

The unique powder metallurgy techniques developed to produce Mallory 1000 are typical of Mallory research in the field of man-made metals . . . and of the work Mallory does in electronics and electrochemistry. Mallory research, engineering and precision products serve the industries which are spurring the nation's economic growth.

In Europe, Mallory special alloys are available through Johnson Matthey Co., Ltd., Hatton Garden—London, England.

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No plant can be better than its supervisors; when their morale falls, productivity soon follows. Now, a new study helps management understand . . . .

Why Foremen Are Unhappy

Digested from FACTORY MANAGEMENT & MAINTENANCE, July, p94

Morale of industrial foremen is at a dangerous low, U. S. executives have just been warned. There is a weakening of the link with management; dissatisfaction with communications; a lack of faith in the possibilities of improving productivity.

Top managers all over the world can take a lesson from what causes poor morale among supervisors—and how it can be improved.

Every two years since 1943 a survey of "Foremen Thinking and the Productivity Problem" has been taken by the Opinion Research Corporation (Princeton, New Jersey). The new trend study includes personal interviews with 911 foremen in 500 companies.

This is not the first time the survey has turned up danger signs. Poor morale forced top management to pay closer attention to foremen's attitudes after World War II. And by 1950 the survey reported a marked improvement. But now ORC warns again that "alert management will need to pay more attention to foremen thinking and training."

Most alarming to most plant operating executives is the finding that foremen lack conviction that their workers can actually improve output. Why? Probably because supervisors cannot inspire their men to higher production if they themselves are not convinced that it can be done. Foremen recognize that production is their responsibility—three quarters say it is their main job. But they just don't know how to improve it.

One trouble: Nearly half the foremen believe that workers do not benefit from improvements in job performance. When foremen think of worker benefits they tend to think of an immediate gain in wages.

But when they think of themselves, foremen rate intangibles high—such things as "satisfaction of getting work out on time" and "recognition for doing a good job in the plant." It seems that many foremen need to be strongly reminded that workers, too, are human and look for similar intangible rewards.

There is a different attitude, however, among supervisors who have had supervisory training. Just over 60% believe that workers benefit from improved productivity regardless of wages. In fact, in case after case, trained foremen show a better conception of their responsibilities, more confidence in their abilities.

But the foremen have some strong criticisms of the kind of training they get. Of foremen who had participated in a training program, almost half say on-the-job problems are bypassed.

Foremen are showing an increasing awareness of human relations

Four Keys to Foreman Morale

Keep Foremen Up-to-date. The foreman's job has changed; he feels the need of new supervisory techniques that cannot be acquired on the job alone. Without thorough training, the new foreman will be frustrated and uncertain.

Job-Training is Essential. Many foremen say their training is too general—or too narrowly technical. They need training in maintenance, work-scheduling, stimulating workers' job interest, worker training.

Inform Them More Fully. Management tells workers to "ask their foreman" about company matters. Yet the foreman is not always informed of plant plans and problems, and loses "face" when he can't answer his men's questions.

Encourage Communication Skill. Persuade foremen that they should take the initiative in talking to workers, and stimulating job interest. A little training in "human relations" helps.

—and the need for new supervisory skills that cannot be acquired through on-the-job experience alone. New foremen in particular feel frustrated and unsure of themselves if not thoroughly indoctrinated in their duties and trained in the human factors.

Many companies have shied away from human relations training because the results are so intangible. Others question the effectiveness of the popular techniques such as "role playing" or the case-study method. But these techniques are the best available, and many companies are using them with success.

The best training, according to the supervisors, is being done in quality control, machine maintenance, safety, work scheduling, and training new workers. Other areas where better training is needed: "stimulating worker interest in their jobs" and "keeping workers informed."

According to the ORC, companies have merchandised the slogan "If you don't know, ask your supervisor." But management evidently has not equipped the supervisor to do the job—especially new foremen. Only 35% say they are kept up-to-date.

And when a foremen doesn't have the information to pass on, he loses stature with the men he supervises. Foremen are often called on to answer questions on the possibility of layoffs, labor contracts, company plans.

One sure sign of discontent: Since 1954 about twice as many foremen in the U.S. either belong to unions or consider themselves candidates. That is despite the fact that under U.S. labor law foremen are considered a part of management. Desire for security and better pay are two big reasons for union sentiment. But almost equally important is the neglect of the foremen's management status.

"Foremen want to be considered a part of management and treated as such," says the ORC report. "But a company doesn't clothe a man with management thinking simply by admitting him to the 'lodge' . . .The time is ripe for more demonstrations of good faith, such as delegating authority and responsibility, to show foremen they are in fact part of management."●

Better Job Methods

"Foremen recognize that production is their responsibility—they just don't know how to improve it," the preceding article points out. One way: Foremen can apply the basic principles of efficiency to job methods.

Digested from TEXTILE WORLD, July, p115

The foreman is not an efficiency expert. He seldom knows much about breaking a job task down into therbligs or Methods-Time-Measurement units, or how to develop simo-motion charts—the textbook techniques used by professional methods engineers. And even if he does know a therblig from a M-T-M unit, he seldom has time to apply such complicated techniques.

Yet he is expected to establish efficient methods—methods that determine productivity and establish pay rates.

In the absence of a methods department, the foremen will do well to improve his analytical skill—the way he looks at the job methods used by his workers.

Fortunately, the foreman can learn to recognize inefficient methods. There are some basic principles he can apply. With these principles, he can concentrate on eliminating inefficient motions.

And combined with the ability to make a breakdown of a job into elements, and to run simple time checks (see MD, July, p29), the foreman can develop acceptable job methods—though admittedly not the best possible—that will greatly improve the efficiency and productivity of his workers.

Here, briefly, are the things foremen can look for:

1. Two hands are better than one. This is a first principle; and an idle hand is easy to spot. Sometimes one hand is used to support the object being worked on. If the object needs support, try to develop a holding device—thus freeing the idle hand for actual work on the object.

2. Combine simple motions. It is easy to make simple reaches or moves with both hands at the same time. The ideal combination is the same motion made by both hands in opposite directions. However, extremely difficult motions—such as positioning to a tight fit or moves to an exact location—should not be combined into a simultaneous movement.

3. Keep the hands in balance. If both hands do the same thing, they should be in motion the same length of time. And with different motions, the time lag should be as short as possible—or else one hand is forced to make a "balancing delay."

4. Watch for body movements. Frequent moves and reaches should involve only the fingers and forearms. Try to minimize—or eliminate—movements with the trunk or shoulders.

5. Beware of obstacles. Changing directions during a move or reach is inefficient—the hand must slow down and then speed up. A straight motion is usually possible if no obstacles are in the way. Remove obstacles if possible, or shift them to shorten the path of the motion. A good motto: "Tread the straight and narrow path."

6. Position supplies. "Search" and "select" are ugly words to the efficiency expert. They add time to the motions called "reach and grasp." If supplies are kept in a constant place, there is no reason for searching or selecting. And arrange the supplies to make grasping them as easy as possible for the worker.

7. Try your own "gimmicks." Time-consuming motions—especially the ones called "pre-positioning" and "positioning exactly"—often require turns, regrasps, and visual perceptions. Homemade devices that guide or stop the action make them more efficient. ●

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French businessmen have been quick to realize that to compete profitably, modern production machinery must be supported by today's advanced record-keeping systems and machines. Burroughs men, such as Pierre Repérant, tailor modern accounting systems and machines to each businessman's needs.

Pierre Repérant first joined the Burroughs Paris office as an accountant in 1950 after two years with a firm of chartered accountants and three years with a fiduciary company. Capitalizing on his experience, Pierre became a sales representative. In 1954 he was named Zone Sales Manager of Paris-East, the city's industrial center.

The world over, Burroughs men like Pierre Repérant are called upon by men of commerce and industry to bring money-saving efficiency to their accounting procedures.

Call your Burroughs man and let his knowledge and experience help solve your business problems. For his address write to International Division, Burroughs Corporation, Detroit 32, Michigan, U.S.A.

Training for Top Management: The

What kind of education is best for future managers? Is "rotation" training better than specialized experience? And who is responsible for executive development?

Such questions are of interest to management everywhere. But nowhere is the concern greater than in Great Britain—now in the midst of a search for a new "dynamism."

The magazine *Business* recently organized a round table discussion on "The Way to the Top." Here are the distilled viewpoints of six distinguished British managers.

W. R. Spenser, Director of Training for management consultants Urwick, Orr & Partners, recommends an education in both arts and sciences—a combination "which the universities, as yet, have not achieved."

Within the business world, training is a joint responsibility. The firm should provide facilities. But the trainee "must attempt to plan his own career and keep control of the planning." He should build his career like a sandwich—layer by layer.

The first thing a young man should learn is how to live in a business community. He should study the background of business problems: What is an organization? Why does responsibility need defining? What is the function of management?

Next, he should study how individual businesses are organized.

Then he needs an appreciation of all the tools of management—work study, market research, and all the rest.

The final layer usually comes in a man's early thirties. It is to study general management problems through case studies—"distilled experience of other poeple."

There is nothing wrong with specialization as such—70% of Britain's top managers started out in some specialized field. Remember that the head of an accounting department is also a line manager, often with hundreds of people under him.

Above all, the individual must provide what is most essential in a man—"a balanced personality."

J. Geoffrey McLean, Managing Director of John McLean & Sons Ltd., believes a firm's biggest responsibility is "to provide the climate under which men can realize their natural ambitions."

As a man matures, accepting responsibility becomes more important. Deliberately load him with responsibilities, and expose him to "forces and situations" that mold his personality for bigger responsibilities.

You need people fighting for promotion and the chance to be trained. Beware of "crown princes"—they kill the incentive of middle and lower management. You can discover some first-class men by removing that "irreplacable" man from the job for awhile.

A firm should make courses available, but fixed training programs are not good. Training depends on the man and his stage of development. Offer training to all foremen and nobody wants it. But if few are chosen, the rest will want to follow. Men who seek out more responsibility select themselves for training.

H. N. Keegan, General Works Manager for Yardley & Co. Ltd., warns against overloading a university graduate with responsibility before he becomes acclimatized to industry—it usually takes about a year.

Rotation training is part of the answer. But it is difficult to convince some men that spending say six months in a department—"looking over someone's shoulder or doing odd little jobs to make himself useful"—is in fact good training. The man should be given a reasonable amount of freedom in choosing the department into which he moves. He should go "from success to success," and not be moved around arbitrarily.

Yardley & Co. concentrates on "making the right man available at the right time" to fill responsible posts. If a man becomes "ready" before a more responsible job opens, he should be advised to go elsewhere. But the problem is usually the opposite—finding enough able men for the num-

Great Debate

ber of opportunities that arise.

A firm should create a climate in which a man can develop himself. But management should guide the individual to some extent—especially men who graduated from the shop floor rather than a university. A man can come up through a technical specialty and have no idea of the literature on art of government.

R. White, General Manager of Percy Boyden & Co. Ltd., cites the case of two arts graduates who quickly dropped out of a group of industrial trainees. Perhaps because of their "great depth of vision," they could not get interested in the "mundane matters" that concern a general manager. The fact is that arts graduates find it difficult or impossible to make decisions in an industrial environment.

Don't sell the scientifically-trained man short—he is by no means ignorant of philosophy and the arts. Usually by 40—"by the time he has his first directorship" —the science-trained man is mature and has considerable breadth of vision.

As for broadening experience, large firms can give full and adequate rotation training. But the majority of young men are in smaller firms. They must know where they are going, and they should be allowed to choose their points of rotation.

A practical difficulty: Training should be timed to finish with an opportunity for promotion.

But there is another problem of development in middle management. Take this case:

The man is between 35 and 40. He has been with the company for 10 or 15 years, and is perhaps a department manager. You are not sure he will make the grade for top management. But you want him to have a live personality, and keep up his potential.

Here is a method that can work like a miracle. Take the man completely away from his normal work for six months. Say, "All right, go up to Bradford and investigate the textile industry. I want a report of 10,000 words."

Going into a different industry, he becomes aware of new techniques and methods. And he is presented with new problems and ideas.

The need is to stimulate men like this. They probably have a good grasp of general management, but their minds are stodgy.

The most important thing, however, is to create a climate of progressiveness.

F. Landmann, General Manager of S. C. Electric Ltd., sees a serious danger in developing managers to one rigid pattern. Originality and independence of thinking are most important. And it doesn't matter "two hoots" whether future managers train in arts, science, or something else.

The top manager's function is to coordinate and integrate specialized skills, but he need not have technical skills himself. In fact, perhaps he should not—it might make him biased.

To successfully operate an executive development scheme, the management team must be integrated. And a valuable product—which often pays for the cost—is the improvement of top management.

The sooner a man gets a chance to make decisions, to get the feel of responsibility (and give management the chance to judge how he takes responsibility), the better for his development. Rotation does not give him that. But a specialized career can.

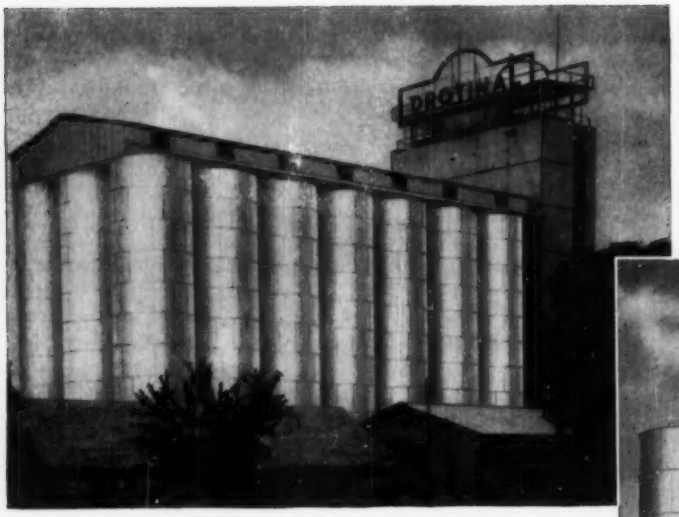
A vital facet of development is to make frequent appraisals of each man. Likewise, each individual should say to himself: "How far have I come? Where am I weak; where strong?

W. I. Sibbald, General Sales Manager of S. C. Johnson & Sons Ltd., is wary of the current tendency toward specialization. Education should develop the mind; but there is a definite need for an entirely new program for aspirants to management.

The experience at S. C. Johnson shows amazing results when men are given added responsibilities. But you need to know a good deal about the man first.

The company realized its great need for sales executives 10 years ago. Of the young men hired as salesmen, about 10% seemed to have potential for executive development. None knew he had been "selected" for development but the promising 10% were watched closely and "fed with the right literature." This informal development was 90% successful.

Sibbald also approves of his son's training as apprentice in an engineering firm. Rotation is flexible, according to the need of the individual. And apprentices serve on plant committees, which allow them to see the broader aspects of management. The system "develops the thinking facility and a determination to probe into every aspect of the job." Sibbald says jokingly his son "now wants to reorganize the whole company."●



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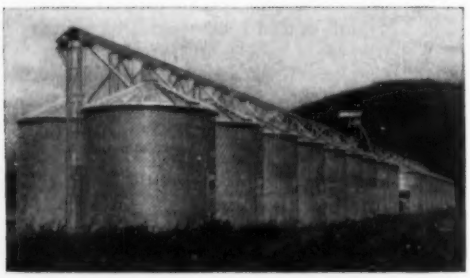

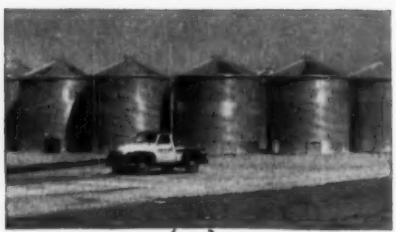

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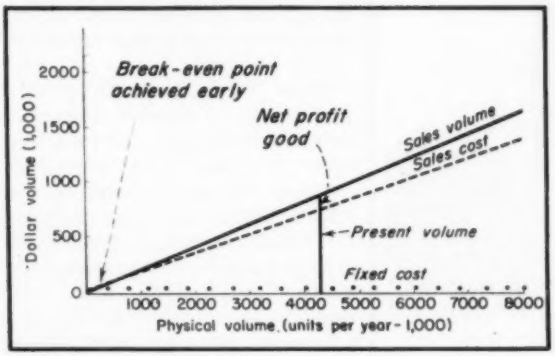
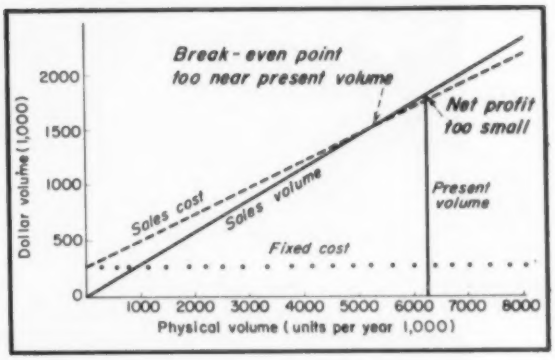


. . . and Weak Management . . .



Put their break-even charts side by side and . . .

Interfirm Comparisons Will Tell

THE BREAK-EVEN GRAPHS above show the results of good and not-so-good management. Although both companies are making a profit, the weak company's break-even point is dangerously close to present sales volume. And an increase in sales would not increase profits nearly as much as for the well-managed company. (For one explanation, compare the difference in fixed costs.)

These charts are taken from a comparison of 31 dairy-product companies made by the School of Industrial Administration of the University of Massachusetts (U.S.A.), with the cooperation of the firms. All plants operate in the state of Massachusetts.

These break-even charts help demonstrate why interfirm comparisons offer such a valuable guide to better management—and why more companies around the world are cooperating in such studies by making their innermost financial secrets available to researchers. The indifference and suspicion of management is being overcome, Professor Sewell-Bray of Cambridge University told the XIth International Congress of Scientific Management in Paris, last June.

Professor Sewell-Bray explained how a Belgium foundry, after participating in a comparative study of 12 foundries, increased its output per man hour 40%. A British furniture maker, cooperating in a survey made by the Furniture Development Council, is saving £1,000 a year through changes in its buying and cutting procedures.

One reason for the wider participation in comparative studies—particularly in Britain—is the successful use of "shock figures" to bring home to firms the value of interfirm comparisons. Professor Sewell-Bray—a leading advocate of such comparisons—has made wide use of productivity figures prepared by the U. S. government's Bureau of Labor Statistics—published as "American Management Ratios for Britain".

And Professor Sewell-Bray has pioneered in a uniform method of collecting data, based on "production value added". A number of European universities — notably Vienna, Louvain, Cologne, Aachen, and Zurich—are actively promoting interfirm comparisons.

The important next step is to make managers more aware of the significance of commonly used ratios such as net worth to fixed assets, inventory to current assets, debts to average daily sales, total assets to net sales, and so on.

In the Massachusetts study of dairy plants, comparisons were made in a variety of management factors, and the results plotted on graphs. A number identified each plant, and each plant was told only its own number. So anonymity was preserved, but valuable comparisons could be made.

"The wide variations found, and the evidence of data collected from the 31 processing plants," says the report, "bring us to this generalization: The managers fully understand their dairy engineering. But they do not completely understand the actual functions and handling of what we call modern management."

By modern management, the University researchers refer to cost control techniques such as motion and time study, personnel planning, standardization of methods and costs, wage incentives, and departmental budgets.

"The true stature of a firm's management," the report continues, "must be measured by its performance in planning the over-all operation of the plant, stating the objectives and the policies of the company, and then exercising the administrative ability to see that they are carried out."

A tendency of the managers interviewed, according to the report, is to "expend most of their efforts in actual processing operations".

Another indication of poor management practice is that "many firms didn't have satisfactory records readily available." For instance, few plants keep records of the output per man hour—though "this is generally considered a very effective measure."

Here is a summary of the factors investigated:

Equipment investment: Little relationship was noticed between total investment and total production. One reason is a wide range of types and ages of equipment. But a disturbing sign is that many

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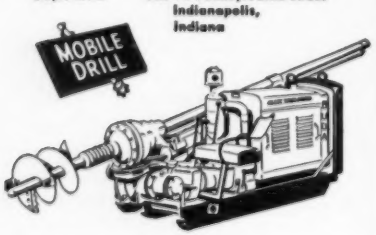

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plants which have recently modernized are over-equipped; capacity is far greater than volume. And that means a poor return per dollar invested.

Plant investment: In general, real estate conforms closely to volume. Smaller processors, however, do better than large ones.

Labor efficiency: Awareness of effective labor and time standards is almost completely lacking, except in plants with very large production and staff. And labor measurement is one of the first principles of good management.

Depreciation of equipment: Some use a five-year write-off, others 10 years. Understanding of depreciation is good.

Ratio of indirect labor: The average for all plants turned out to be 71% for direct labor, 29% for indirect labor—a relationship that is not exorbitant for dairies. But the smaller plants above the average would benefit greatly by reducing non-productive labor.

Labor turnover: An extra-long work day hurts dairy firms. Average turnover in the 31 plants is 20%—five times higher than the U. S. average for all industry. But some plants do much better than others, indicating that some managers do not understand the high cost of worker turnover.

Machine efficiency: Most managers could give only rough estimates. Efficiency figures range all the way from 30% to 125%.

With this information — plus specific plant figures in chart form —the dairy managers are in a much better position to strengthen their competitive weaknesses. ●

Sources: Food Engineering, July, p55; Report of XI International Congress of Scientific Management, p223, June, 1957, Paris.

In Management

● **"SLIPPING" EXECUTIVES who have passed their peak of usefulness often need special treatment.** They are not necessarily over-age. But it is easy to spot them if you apply this 10 point guide. An executive is slipping when he:

1. Talks more about what he did in the past than what he plans to do in the future.

2. Blames his shortcomings and failures on new competition, the weather, or "conditions."

3. Begins to lose interest in figures.

4. Begins to think the business can't get along without him.

5. Becomes adept at thinking of reasons why a new idea or method won't work.

6. Confides to his friends that the boss does not appreciate the years he has "given" to the business.

7. Secretly feels that his position "rates" a bigger office or a larger staff.

8. Arrives at work later, lunches longer, and leaves the office earlier.

9. Tries to convince people that the time he spends on the golf course is good for business.

10. Loses the knack of talking *with* people and begins to talk *at* them. (*American Business, July, p20*)

● **SAFETY CONSCIOUSNESS in U.S. industrial plants impressed a team of Swiss insurance men** on a recent tour. Swiss industry does well mechanically safeguarding workers, the insurance men say, but it could profitably apply more industrial psychology.

Americans are "disciplined" to safety from childhood, and U.S. workers are better informed as a group on hazards at work, says their report, published by the Swiss National Accident Fund.

● **BRITISH MANAGERS had a hint of what to expect if the Labor Party regains power.** Steel and road haulage would be "renationalized." Beyond that, a Labor Party policy recommendation says, "We have no intention of interfering in the management of any firm which is doing a good job."

Presumably, a management "falling down on the job" would go before a government board of inquiry. Then the government might reserve the right to buy enough of the company's shares to control it.

These recommendations go before a Labor Party conference next month.

● **GOLF COURSES** are now owned by close to 100 corporations in the U.S.A. for golfing employees.

▶ YOU AND YOUR PERSONAL AFFAIRS

Planning a trip to the U.S.A.? Be prepared to spend between $20 and $60 a day for expenses there.

Those figures, incidentally, cover the range of dollar allowances some governments make available for business travel. The $20 is close to a bare minimum—and if you like the finest hotels, the best theater, and have to entertain, the $60 can easily stretch to $75 or even $100.

"Getting acquainted" with the U.S.A. is a frequent reason for a visit. But you find few foreigners coming to see historical monuments, natural wonders, or cultural treasures. Visitors seem more interested in industrial sights and medical centers than in the Grand Canyon.

Most visitors are curious about things American, such as:

—Construction. Visitors stand by the hour watching a new building go up; some new projects have viewing booths especially for "sidewalk superintendents."

—Marketing. The Yankee drug store, supermarket, shopping center, vending machine, always intrigue visitors.

—The sheer immensity of New York, the beauty of San Francisco, the beach and night-life of Miami, the old-world calm of New England, and brash hurry of Texas.

By all means, try to arrange a side-trip outside the big commercial cities. A week-end jaunt to New England is easy from New York; a visit to rural Illinois or Wisconsin can be made from Chicago.

Check with your own auto club (or the American Automobile Club) for information about driving. Italian, French, Swiss, Scandinavian, and Benelux drivers' licenses can be validated without charge. Most other visitors have to take a driving test. Car rental begins at $7 a day, plus 7¢ a mile.

For public transport, allow about 5.5¢ a mile on the train, 6.4¢ by plane. Luxury buses are worth looking into.

Hotel rates in the larger cities begin at $5 to $8.50 daily for a single room and bath, or $8.50 to $12.50 for a double.

Do not expect the kind of hotel service you are used to in Europe or Latin America. Most employees are willing and capable, but they won't be hanging over you with service.

Tipping: In larger cities, 15% of the bill is usual. A "quarter"—25¢—is fine for hat-check girls, doormen, barbers. Figure 25¢ for each suitcase in a hotel, 50¢ to $1 for the sleeping car porter. No tips on airplanes.

You have your choice of good food in large cities—including some excellent European and Oriental cuisine.

While most American restaurants stick to a "beef, chops, chicken menu," look for unique and memorable regional dishes. Under $3 for dinner is considered "reasonable;" over $5 is "expensive." Imported wines are available but often expensive. Try some of the fine domestic wines.

Watch dinner hours. They are usually from 6 P.M. to 8:30 P.M. If you are in a smaller city, you may not get fed if you wait past 8 P.M. But there is always a drug-store counter.

There is nothing comparable to the **Guide Michelin** to locate the best food. But the Duncan Hines or Gourmet magazine guides to restaurants will be helpful.

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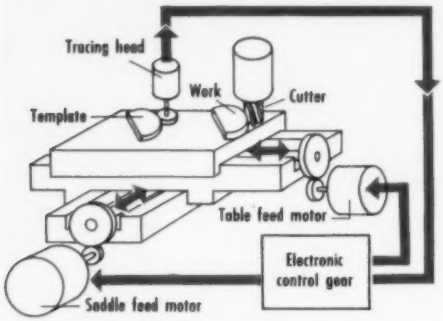

How Electronic Tracing Works

Information from a stylus is converted by electronic control gear into electric currents which operate feed motors.

What You Obtain:

Tracer-controlled machines repeat "master's" shape on workpiece.

You get cheaper short-run work, faster quantity production.

It's one step short of punched-card or tape-controlled machines.

Metalworking: Try Automatic Copying

Digested from BUSINESS, July, p83

You have heard about metalworking machines that act automatically on information presented to them in the form of punched cards, punched tape, or magnetic tape. Their ability to "make parts straight off the drawing-board" has overshadowed important developments in tracer-control systems. And the latter can often be more useful and practical for the average metalworking shop.

Tracer-control means exactly what it says: A stylus follows the contour of a template or three-dimensional master and transmits information to the machine's controls. Thus the shape and dimensions of the "model" are reproduced automatically in the workpiece. In some applications, the stylus moves over a stationary template; in others the model (which may be a prototype part) is rotated.

Tracer-control can be applied simultaneously to one, two, or three motions of a machine tool. Probably the most straightforward example of one-dimensional work is where a tracing stylus, traversing a flat template, "directs" the cross-slide motion of a lathe. In two-dimensional work, there is automatic control of two feed motions, usually at right-angles to each other—for example, the saddle and table feeds of a vertical milling machine (above). Three-dimensional control has more specialized applications.

Compared to "automatics"—the tape and punch-card controlled machines—tracer machine tools are more flexible. The automatics need relays, limit switches, and electronic gear to control their operations. Tracer-controlled machines can do short-run work economically: setting-up for different jobs is relatively simple. Once the model has been made and set up, the machine can turn out replicas at many times the speed (depending on the operation) of manually-controlled lathes, millers.

At the same time, tracer-control is capable of speeding up some types of mass-production. The technique is being used to mass-produce components for vehicle and other manufacturers, handle short-run work for job shops, turn out components in small numbers for experimental purposes.

This is the present state of development of tracer-control systems:

1. Machine tools are now generally designed specifically for tracer-copying with all controls built-in.

2. The continuous development of hydraulic tracers has offset some of the inherent drawbacks of this form of linkage, and has enabled its advantages to be exploited more fully.

3. Electronic control systems have broadened the scope of tracer-copying by making possible higher standards of accuracy, and simultaneous automatic control of two or three feed motions.

4. By adding automatic loading and unloading devices, tracers are converted into what are, to all intents and purposes, transfer machines. One operator, not necessarily skilled, can look after a group of them; skill is required only for setting-up.

Tracer-control gives some of the advantages of the much-publicized numerical control systems—which have barely emerged from the development stage. They cannot produce parts automatically from drawing-office information; the "master" or template has first to be made on a manually-controlled machine. Still, tracer-control systems have practical advantages:

—One model serves for both roughing and finishing cuts.

—Modifications to models can be carried out in the production shop.

—Tracer-controlled equipment is much cheaper than magnetic tape and similar systems.

Two kinds of tool control are used: electronic and hydraulic.

The main parts of an electronic control system are the tracing head (which incorporates the stylus); the special direct-current electric motors which operate the machine feeds; and the vacuum tubes and circuits which coordinate stylus and motors.

The stylus is basically a metal rod, free at the tracing end and held rigidly at the other. Part of it is surrounded by coils carrying high-frequency current. As it moves along the template, it disturbs the magnetic fields. The resulting electric signals and

phase shifts are amplified and analyzed by the circuits to the point where they can actuate the motors. These are special motors designed for accurate movement, fast acceleration, and very fast reversal.

Parts turned out by an electronic system usually have greater part-to-part similarity than those made with the hydraulic tracers. For example, the tolerance specified on a blueprint may be plus or minus 0.005. A component 0.004 "over" and one 0.004 "under" would be inside the blueprint tolerance, but the part-to-part difference would be 0.008. For certain products this might be excessive. Discrepancies of this order are possible with hydraulic linkage. But electronic linkage is inherently stable.

Another advantage of electronic tracing systems is that they represent about three-quarters of the control equipment required if the machines are to be eventually converted for punched card or magnetic tape programming. This increases the potential versatility of the system, and makes it a more attractive long-term investment, at least for larger shops.

But hydraulically-controlled systems have not been out-dated by electronic systems. On many kinds of work they are just as efficient; and, as a rule, they are much cheaper.

Some hydraulically-controlled machine tools perform very complex operations. They can cut eccentric and spherical shapes on shafts with great accuracy and also with acceptable speed.

The usual run of lathe work calls for a low cross-slide feed rate, but there are applications which require sharp and frequent changes in direction. From a suitably-compensated template, a hydraulic tracer will produce square shoulders on shafts, but because of the angle at which the tool is held and the inertia of the system, it cannot easily make re-entrant cuts in a shoulder or spherical shape. These difficult operations, which often require automatic control of more than one motion at right-angles to each other, can more conveniently be achieved by electronic tracing systems. ●

SPRAY PROCESS brightens mirrors, may be used for printed circuits.

New Process, New Luster

Digested from CHEMICAL WEEK, June 29, p92

A versatile new process for depositing ultrafine-grain films of silver or copper has been developed by Silaco Chemical Co. (Chicago, Illinois, U.S.A.). Major applications to date include mirrors, ornamental ware, electrotypes (printing plates) and, most recently, printed circuits.

Silaco says the process will produce films (on virtually any surface, including wax) with better adhesion and finer grain than that of conventionally produced films. But Silaco refuses to give complete details on how it achieves these advantages, other than to say that they are inherent in finishes produced by its ultraviolet catalyzed coating system.

Two solutions are used, an ammonical silver (plus the ultraviolet-catalyzed organic compound), and a colloidal copper made from conventional copper salts by special techniques. The copper solution has a short life—about three days. Silaco sells the copper solution formula direct (for a flat fee, not a license royalty) to users, and provides technical service.

Complete equipment — spray booth, two spray guns, three aspirator bottles—costs about $500. About $125 converts a conventional installation to Silaco's system.

Although rear surfaces of mirrors show a light copper cast, Silaco says the front side is as bright as that of conventional mirrors. And the Silaco film adheres to the glass tightly.

The durability of the film and its mirror-like luster are the main attractions the new process has for houseware makers. In the electrotype industry, advantages include good penetration by the fine-grain material into crevices, and virtual elimination of blisters, pinholes, other imperfections.

Probably the most important use of copper coating right now is in the manufacture of printed circuits for the electronics industry. Colloidal copper salts, with an organic compound and a special reducing agent, are applied through a double-headed spray gun. The prime advantage is the spray's ability to get into the solder connection holes of the phenolic backing board. This is not possible with copper-foil laminates.

After the deposition of the copper film, the printed-circuit maker masks off the circuit desired, removes unwanted copper and plates the board. ●

See your representative listed below for: Plastics, Polyester Resins, Chemicals, Textiles, Cellulose Acetate.

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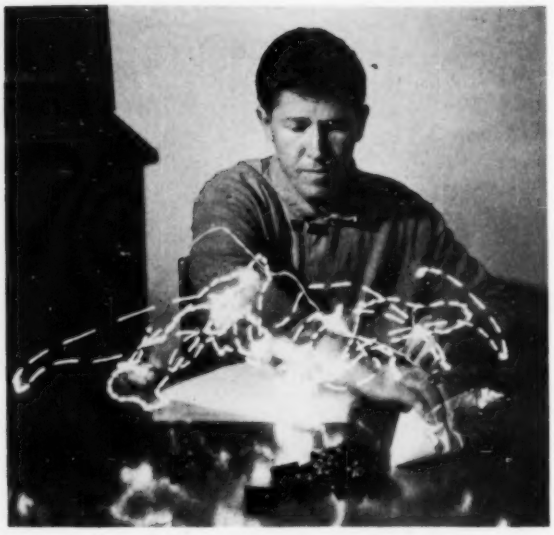
NEW Sound waves from sender on worker's hand are recorded by microphones in new time-and-motion method.



OLD Standard old method was photographing light patterns made by worker. Result was two-dimensional.

Sound Waves Do a Time Study

Digested from BUSINESS WEEK, May 11, p192

INDUSTRIAL ENGINEERS who work with time-and-motion studies may soon get a new tool. A machine called Universal Operator Analyzer and Recorder (Unopar) provides a three-dimensional picture of the movements of a worker's hand. Developed by Prof. Gerald Nadler, head of the Industrial Engineering Dept. at Washington University (St. Louis, Missouri, U. S. A.), the machine shows signs of doing things other time-and-motion systems cannot do.

In charting the movements of hand and body, and thus determining what movements can be eliminated for greater efficiency, the time-and-motion engineers have always encountered obstacles. Movement is infinitely elusive, even to the electric eye. And human observers have tended merely to make the subject of their observations nervous, irritable, and clumsy. Often, the studies fall far short of accuracy.

Unopar may put an end to these frustrations through an ingenious application of the Doppler effect. The principle is this: Sound waves reach the listener at more frequent intervals when the source of the sound and the listener are moving toward each other, in effect squeezing the waves together. This raises the pitch of sound. The reverse occurs when sound source and listener are moving apart. The same phenomenon occurs with both radio and light waves.

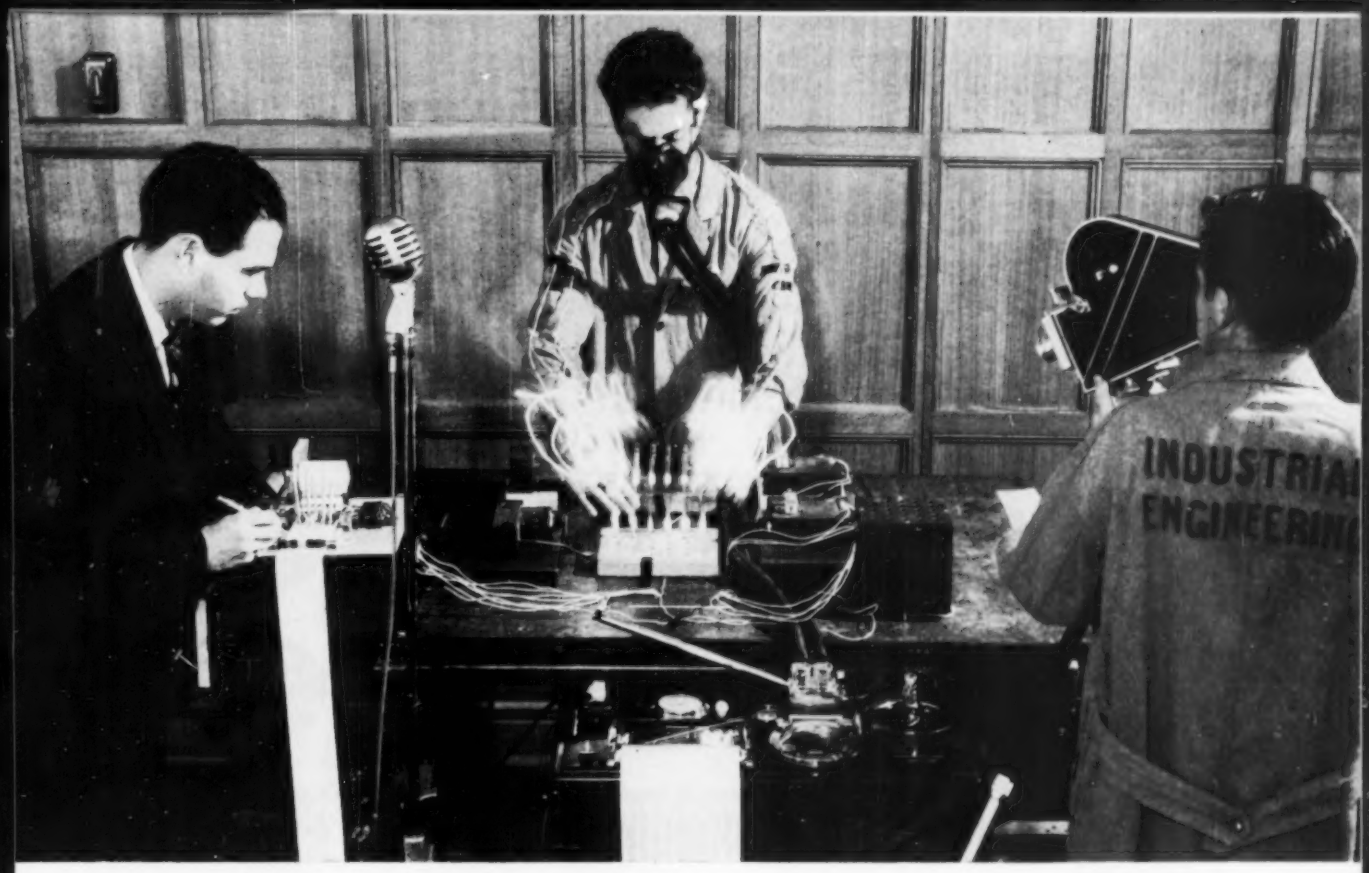
The classic illustration is the locomotive whistle whose pitch is more shrill as the locomotive bears down on the observer, and then suddenly becomes less shrill as it moves away from him. Of course, this effect of changing pitch is quite apart from the mere volume of sound which is greater when the whistle is nearer to the listener, but not necessarily shriller.

Nadler's device had its origin in the fact that an accurate recording of the changing pitch of sound could be made to provide an accurate chart of movement. In his present mechanism, he attaches to the subject's hand a small sound generator that provides high-frequency waves inaudible to the human ear. These sound waves are picked up by three microphones, so adjusted that their composite "listening" translates the variations of sound frequency into a three-dimensional diagram of the movements of the hand and its sound source. Recorded automatically on graph paper, this is exactly the picture the industrial engineer needs.

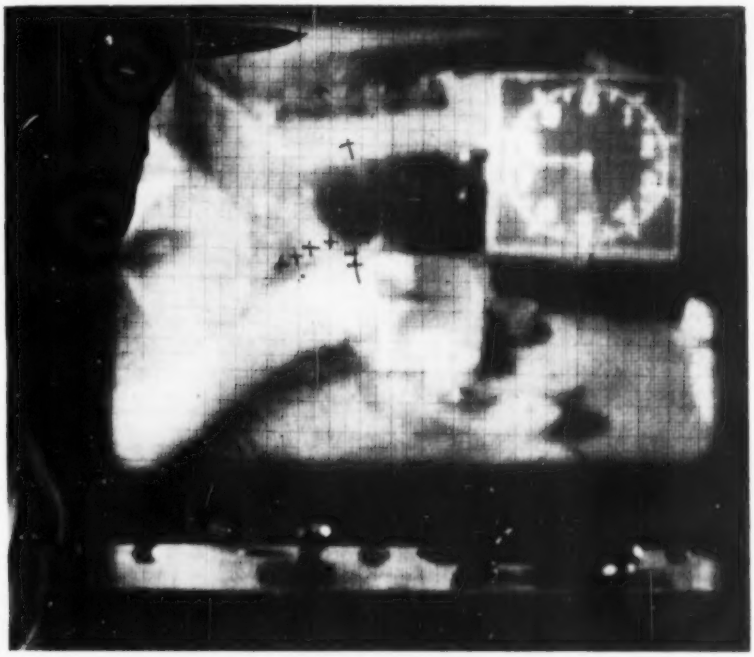
Nadler is now seeking to improve his equipment so that it can be attached to any part of the body, and thus record all the movements of the worker, not just his hands. But this is adding to Unopar's complications at its present stage of development. So as Nadler works toward broadening the device's application, he is also seeking to simplify it for mass production.

Nadler and his associates are not saying, however, how long it will be before their equipment will be ready. Meanwhile industrial engineers will continue to rely on slow motion movies, photoelectric cells, body contact switches, measurements of oxygen intake and heart beat, time exposures with light patterns, stop watches, and, of course, the human eye.

But Unopar is attracting interest outside of industry. The Office of Naval Research (U.S.A.) has underwritten a $12,800 contract for applying Unopar time-and-motion studies to improving training methods. The Navy also hopes to use the results to set up new selection tests for specialized jobs. ●



DEMONSTRATION of all techniques in use at the same time include camera, electrocardiogram, and Unopar.

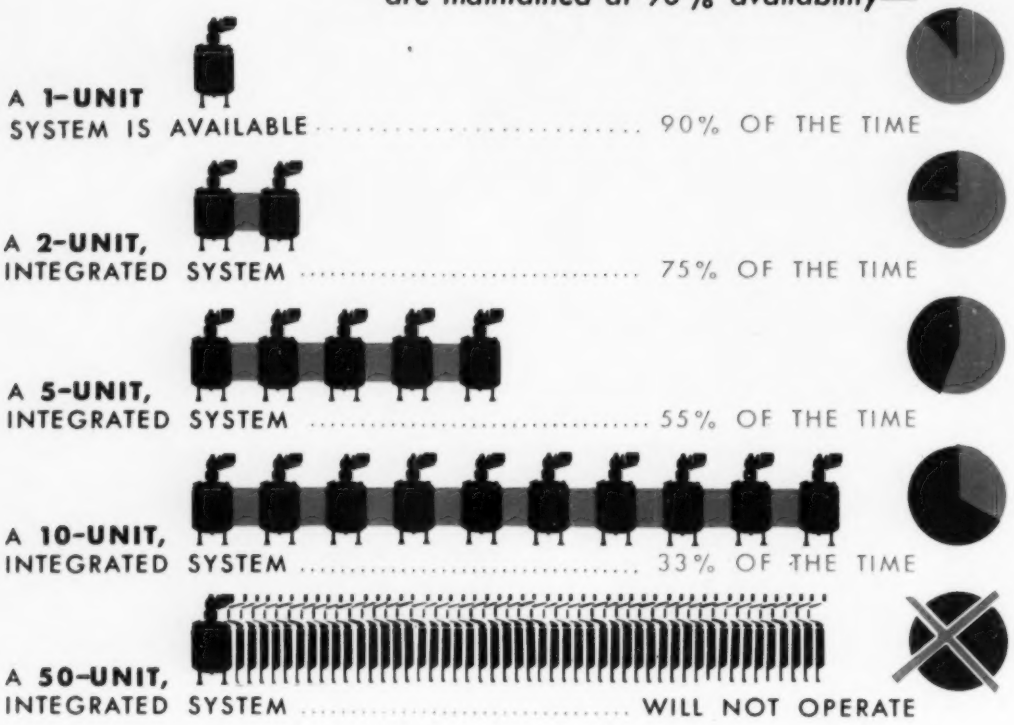


MOVIE RECORD of worker's movements has disadvantage of giving two-dimensional account of a three-dimensional activity.

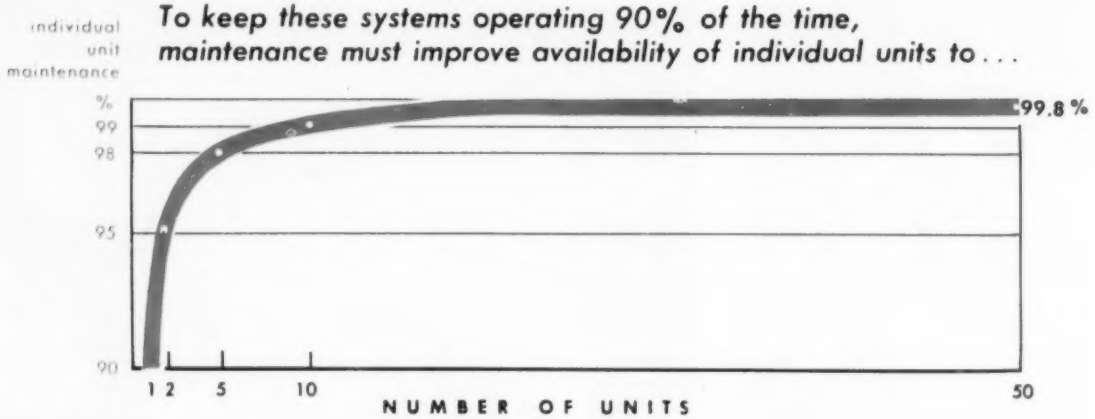
ELECTROCARDIOGRAM measures effort, but not motions. At left is Prof. Gerald Nadler, developed of Unopar.

In Du Pont Automation Studies . . .

Maintenance specialists find that if individual units are maintained at 90% availability—


A 1-UNIT SYSTEM IS AVAILABLE ..... 90% OF THE TIME
A 2-UNIT, INTEGRATED SYSTEM ..... 75% OF THE TIME
A 5-UNIT, INTEGRATED SYSTEM ..... 55% OF THE TIME
A 10-UNIT, INTEGRATED SYSTEM ..... 33% OF THE TIME
A 50-UNIT, INTEGRATED SYSTEM ..... WILL NOT OPERATE

To keep these systems operating 90% of the time, maintenance must improve availability of individual units to . . .



New Demands on Maintenance

Digested from CHEMICAL WEEK, June 29, p64

The chart above emphasizes one of automation's major pitfalls: Although it holds out the promise of increased production and lower operating costs, it can have the reverse effect unless accompanied by more effective maintenance.

Much emphasis has been placed on what automation can do, but in the bright pictures usually painted maintenance is often glossed over. That is why a study made by E. I. du Pont de Nemours & Co. (U.S.A.) is important to anyone considering more automatic production methods. It points up the fact that the more complex a process or machine gets, the more dependent it is on maintenance.

There are many facets to the solution of increasing maintenance

problems, of course. Improved equipment design, better planning of preventive maintenance programs, are two. But training of the maintenance worker is one of the most important.

Du Pont's maintenance engineering section developed a basic program six years ago, has been improving it since. Now it has adopted lesson-plan training which substitutes individual lessons for topics or chapters in a more formal maintenance manual. The company hopes to overcome increasing maintenance complexities with this kind of training.

Each lesson is put together so that it can be covered in a two-hour class. It deals with a piece of equipment or a type of operation. Typically, a lesson on bearings covers hazards of maintenance work on bearings, types of bearing failures, causes of bearing failures. It aims to teach the trainee how to spot faulty bearings.

Du Pont's training breaks with apprenticeship and specialization wherever possible. It trains mechanics in up to 500 hours; the U. S. Dept. of Labor standard for apprenticeships is 4,000 hours minimum. "Multi-skills," rather than specialization, are stressed because du Pont feels it can get better maintenance if a mechanic can service a whole process rather than just a special part of it.

Some skills are no longer frequently called for; others are in increased demand. Du Pont finds that there is less need for lead-burning, carpentry, bricklaying and blacksmithing. But there is urgent need for instrument men, welders, millwrights, pipefitters and electricians.

Foremen train their own men. This helps to build up confidence of the mechanics in their superiors. In addition, it helps the foremen retain and solidify their own knowledge of the subject. The foremen are put through a 40-hour training program on how to train men. The toughest job has been to teach the foremen the trick of shifting the burden to the individual trainee, getting discussion and demonstration participation without making the individual feel uncomfortable.

Du Pont's training program pays off in ways other than better maintenance:

—It provides another basis for judging advancement, does not leave it completely to foremen's opinion, or length of service (both of which are important).

—Safety records are improved. Men trained in du Pont's program had only one-tenth as many accidents as those who had not participated.

Not every company need go to the lengths that du Pont has in setting up its training program. But there are some elements in the lesson-plan approach that could have universal application.

A cheaper alternative for a smaller company or a single plant might be to hire a full-time instructor. But when the instructor leaves, the program would come to a halt. Another alternative would be to design a simple lesson-plan manual. It would offer less chance of interruption once a backlog of lessons had been built up. ●

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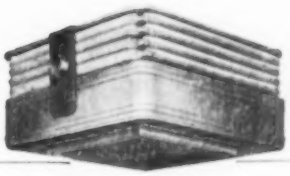

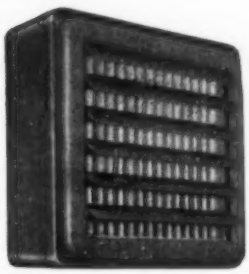

VENTURAFIN UNIT HEATER – for horizontal blow. High-volumetric capacity; adjustable louvers. Designed for factories, garages, warehouses and commercial buildings. Described in Bulletin 9017.

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What is "Cost Engineering?"

ENGINEERS are generally thought of as primarily concerned with the technical means needed to solve problems. But more and more, every step toward each solution is conditioned by the question "How much will it cost?" To be sure, engineers have always been cost-conscious. But at no time in the past has cost taken on such significance in the fields of technology and production management.

The reason is clear enough. A shift in the economic pattern of many industries is taking place. Most managers feel the "cost-price squeeze"—it costs them more each year to stay in business, yet they are less able to pass all the extra costs on.

SOME AMERICAN engineers have taken a serious enough view of this situation to form the American Association of Cost Engineers. One of the purposes of the new organization is to clarify and propagate the principles of "cost engineering". The AACE defines cost engineering as the application of scientific principles and techniques to problems of cost estimation, cost control, and profitability.

A recent meeting of the AACE heard Cecil Chilton, Senior Associate Editor of *Chemical Engineering* and one of the group's founding members, pose this question: Is cost engineering's status comparable to that of the established branches of engineering—civil, mechanical, chemical? Chilton says no—"there is no such branch of engineering as cost engineering." But it is a larger part of all engineering.

AN ENGINEER (according to one popular definition) is a person who can do for one peso or pound what a fool can do for two. Even the more formal definitions of engineering emphasize the aspect of economics in the engineer's activities. In practice, engineering becomes largely a matter of costs. And Chilton goes on to say that all engineering is cost engineering.

This is his proof:

The principle of a free economy, as applied to most types of business and industry, can be expressed in the form of a simple equation:

$$\left(\frac{S-E}{I}\right) y = r$$

S is the money coming into the business from sales over a certain period of time.

E is the money paid out for materials, labor, taxes, and all other expenses over the same period of time.

I is the money invested in the business, in both permanent facilities and in working capital.

y is a "risk factor."

r is the return on the investment expressed as a fraction or decimal based on the given time.

For any future period of time where S, E and I must be estimated, y represents the probability that return r will be realized.

ANYTHING the engineer does to maximize S and y will help the business. By the same token engineers strive to minimize E and I.

These are some of the things engineers should be doing to maximize S: selling, customer service, market development, quality control, package design. Not all are engineering jobs, but you find engineers doing all of them.

These things help minimize E: mechanization to save labor, standardization, operating supervision, studies of financing methods.

The engineer tries to minimize I through better plant design, inventory control, selection of equipment.

y can be maximized through market research, process research, consulting, pilot studies.

Chilton feels that you can categorize any other useful engineering function according to the effect it has in maximizing S and y and minimizing E and I. This, he adds, proves his point that all engineering is basically cost engineering.

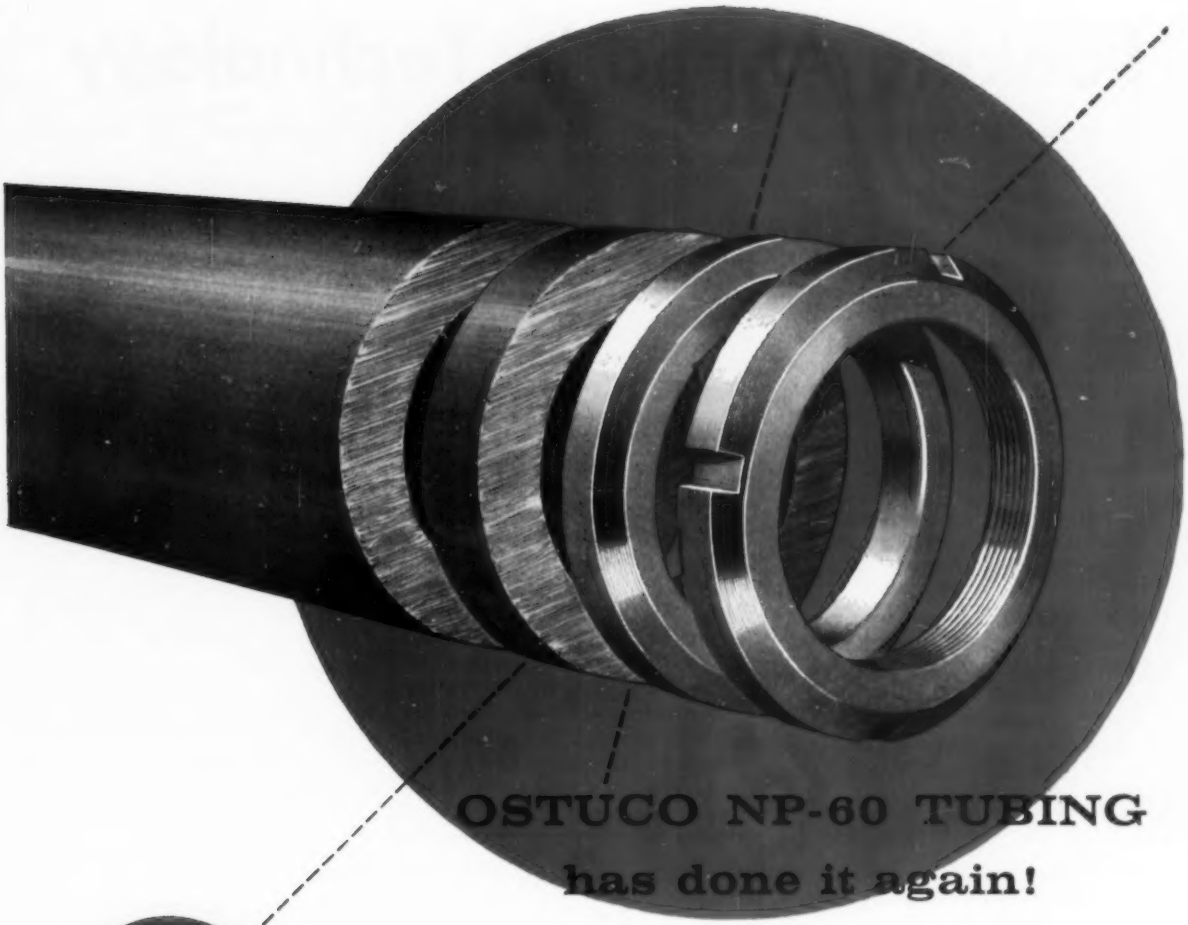
The logical conclusion, then, is that all engineers are cost engineers. This is not the case, according to Chilton. Many engineers are technically proficient, but economically ignorant. For instance, a common engineering error is to apply a set of economic conditions that fitted one problem to another problem without checking to see if the conditions still apply.

THERE ARE several reasons for the apparent lack of cost-consciousness in many otherwise capable engineers. For one thing, most engineers start with less-than-adequate formal instruction in engineering economics. And it is not easy to pick up familiarity with economics while on the job.

These conditions are changing. The formation of the AACE is one sign of this trend.

BUT WHAT is the difference between cost engineering and cost estimation? Chilton believes cost estimation is one of the professional tools of the cost engineer. Its ultimate purpose is to provide the basis for a final decision. The cost engineer often makes his own cost estimates. But some companies employ estimators—directed by professional engineers—to perform the routine task. Chilton does not think these cost estimators qualify as "cost engineers."

Cost engineering, he says, is truly a profession, not a trade. It is not a new profession. But now the pressures of modern competitive business have pushed cost engineering to the forefront—and have made it absolutely indispensable. ●



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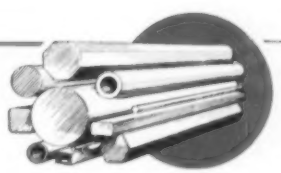


Looking Ahead in Technology

● **FOAMED ALUMINUM may replace wood** in some construction applications if research work at Bjorksten Laboratories (U.S.A.) proves successful. The material, just slightly heavier than balsa wood, can be sawed, nailed, screwed, cemented, or bolted. The company says that the product could potentially be made as cheaply as lumber—and eventually might be used instead of lumber in some applications, thanks to its resistance to corrosion and to fire. But development is still in an early stage, and many problems remain to be overcome. (*Chemical Week, July* 13, *p*57)

● **MEDICINALS to preserve steel?** Three Japanese scientists have found that small amounts of salvarsan (0.4%) or penicillin (0.03%) prevent bacterial corrosion of steel. Their work is reported in the German publication *Naturwissenschaften* (*Vol.* 44, 1957).

● **DIESEL ENGINE with 50% thermal efficiency** has been designed at Stevens Institute of Technology (U.S.A.). The engine is based on work done at the Technische Hochschule (Darmstadt, Germany). The 50% efficiency figure is based on data from German tests and calculations from the new Stevens design which incorporates a special combustion chamber. The special chamber allows a slow mixing of air and fuel to give a slower burning rate; peak pressure is about twice that of a conventional diesel engine. The designers say the engine will be one-third the size of a conventional engine with the same power and use 10% less fuel. (*Product Enginering, July , p*12)

● **SMALL, hard particles a few millionths of a centimeter in diameter are being "dispersed" in alloys** to form new high-strength materials which will withstand red-hot temperatures. Armour Research Foundation (U.S.A.) metallurgists say the powder particles act much like gravel reinforcement in an asphalt road. "Dispersion strengthening" also could increase resistance to abrasive wear.

● **METALLURGY and medicine have joined forces** to develop the first metal spring ever used to repair a human heart. Made of Elgin National Watch Co.'s (U.S.A.) mainspring material, "Elgiloy," the Y-shaped springs were tried first in dogs. A diamond-shaped spring wrapped with nylon was finally placed in a woman's heart. Surgeons say it has functioned 40-million times.

● **HOW TIGHTLY do organic coatings stick to metal surfaces?** The Paint Div. of Imperial Chemical Industries Ltd. (England) thinks it has a way of finding out. It paints a sample of the coating on to a thin steel disk. Then the disk is fired much like a bullet at a specially designed steel target. The target has a hole at the place where the coated part of the disk hits it. Thus the steel disk is stopped abruptly by the target while the coating continues on through the hole. The ability of the coating to stick to the disk is related to the speed of the disk before it hits the target. (*Product Engineering, July p*9)

● **THE NOSE may have a competitor.** Researchers at the Southwest Research Institute (San Antonio, Texas, U.S.A.) are testing a mechanical nose for sniffing coffee. It may eventually be used to tell coffee processors how long to roast coffee to maintain a given flavor and aroma—thus taking much of the guesswork out of making good coffee. Its technical name is "vapor phase fractometer."

● **CANADA'S new steel tube mill at Sault Ste. Marie is billed as the world's first fully automatic plant of its kind.** It was built by Man-

Triplets for Electronics

Within the space of about three weeks three new developments have caused a stir in the U. S. electronics industry.

Sylvania Electric Products Corp. (U. S. A.) has created a flat image-producing panel that it calls Sylvatron. The panel combines the techniques of producing light by exciting phosphors in an electrical field (electroluminescence) and influencing by light the flow of electricity through a solid (photoconductance).

Sylvania sees the panels as having "important possibilities" in radar, air traffic control, computers, etc.

Three types are available so far: (1) a panel on which the position of a mobile dot of light can be manipulated electrically; (2) a display panel which reproduces and stores visibly the track of a mobile spot of light; (3) a panel which can reproduce optically a motion picture with good resolution and rapid response.

Raytheon Mfg. Corp. (U.S.A.) has a new semiconductor named "Spacistor" that combines the operating advantages of the vacuum tube with the compactness of the transistor. If made with silicon carbide, the Spacistor could handle frequencies up to 10,000 megacycles at temperatures up to 500°C.—a frequency far beyond that of the transistor and a temperature far beyond that of the vacuum tube.

U. S. Naval Ordnance Laboratory's solion may supplant electron tubes and transistors in some uses. Solion makes use of the natural laws governing the movement of electrons through a fluid—instead of through space as in an electron tube, or through a solid as in transistors. It can detect pressure (or acceleration) and provide an amplified output. First use will be as a navigational integrator for inertial guidance systems. (*Electronics, Aviation Week*)

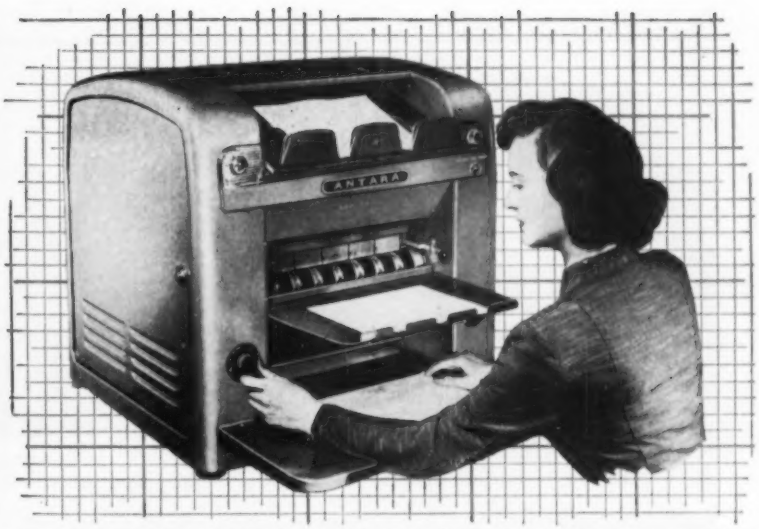
nesmann Tube Co. Ltd., subsidiary of Germany's Mannesmann A.G.; operations—from heating steel billets through inspection to final cooling—are done continuously.

● **PAPER made from Philippine bamboo shows promise** in tests at the U. S. Forest Products Laboratory (Madison, Wisconsin, U.S.A.). The paper does not tear easily and compares favorably in bleaching quality with the best North American hardwood types.

● **TEN CALVES per cow each year are possible,** according to British scientists at Molteno Institute of Biology and Parasitology (Cambridge). Here is their thinking, based on experiments with sheep: A hormone serum, obtained from pregnant mares, is injected in a top-grade cow. The serum causes the animal's ovaries to send a greater-than-normal number of eggs from the ovaries toward the womb. The eggs can be fertilized on their way to the womb—either by artificial insemination or by natural breeding. Then they are extracted from the female, and transplanted by surgery into the wombs of several other cows, who, in effect, become proxy mothers.

The theory is to use, as proxies, cows of less quality, or who are sterile. No matter what the bad characteristics of the host or recipient cow, the calf should show all the qualities and characteristics of the prized real mother. Thus a farmer with one prize cow and nine substandard cows might get nine or ten top-grade calves. *(Wall Street Journal, July 5)*

● **SYNTHETIC DETERGENTS have found a new job—fighting fires in coal mines.** The technique was developed by the mines research branch of the British Ministry of Power. A foam of low weight but high water retention is generated by spraying a mixture of water and detergent onto a coarse net placed in the underground roadway on the windward side of the fire. Passing through the mesh of the net, the detergent produces a wall of foam, which is blown along the roadway toward the fire. This wall of foam helps smother the fire by excluding air and dampening the area.



ANTARA O-M — Desk-top model with many of the fine features found only on larger machines. Provides large-volume capacity. For prints and copies from originals up to 16" wide (41cm) at speeds up to 30' (9.14m) per minute.

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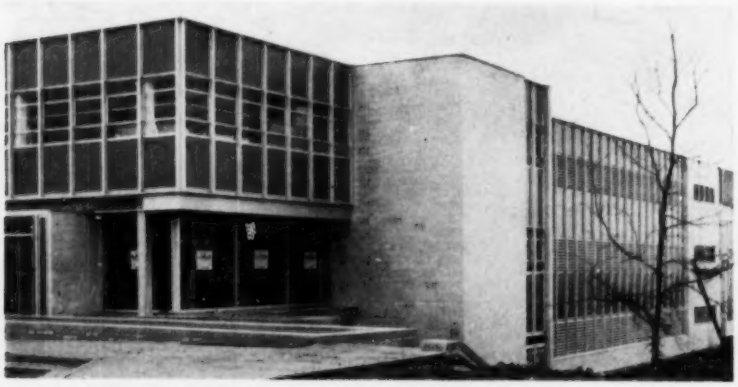
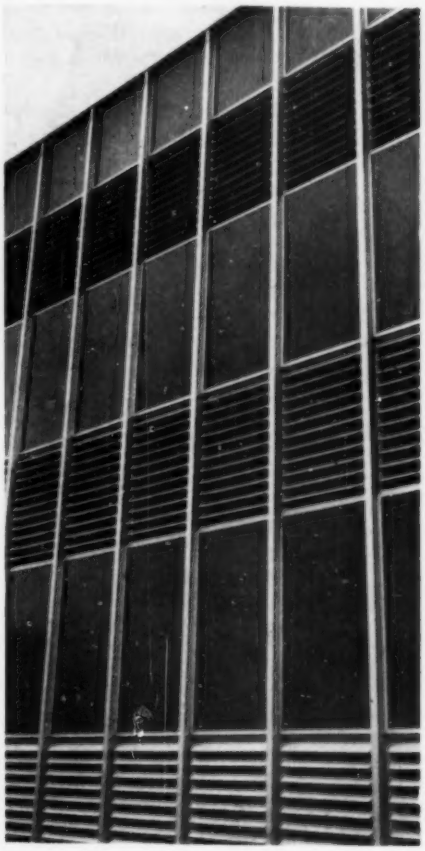


NEW LAB BUILDING uses plastics wherever possible. It is designed to demonstrate the possibilties of these new materials in construction.

EXTERIOR WALL is faced with concrete block coated with colored reinforced polyester plastic. The block are laid in the conventional manner.



WINDOWS made of acrylic have serrations coated to keep out sun.

A New Plastic Laboratory and...

PAINT for steel beams is urethane-based, matches color of pipe.

ACOUSTIC TILE installed in suspended ceiling has a plastic face.

THE CONSTRUCTION INDUSTRY these days is getting a good look at what plastics have to offer. Two "showcases" for plastics applications in building have just been completed.

The first is a laboratory designed to demonstrate plastics' versatility within the framework of conventional building practices. The laboratory (pictures, this page) is at work today; the plastic house (picture, facing page) is admittedly for tomorrow. Both are developments of Monsanto Chemical Co., the U.S. producer of plastics raw materials.

The laboratory building is made of reinforced concrete, but exterior walls were built mainly with reinforced, polyester-faced concrete block and sandwich panels. The latter have reinforced-

HOUSE OF THE FUTURE is fully equipped to forecast things to come. With the exception of fasteners, the frame of the house is completely made of plastics. Each wing consists of two factory-molded fiber-glass sandwiches.

...House Preview Building Future

polyester facings and foamed-styrene insulation cores.

Many of the windows are made of a transparent acrylic plastic, fabricated with horizontal serrations. Their cost is comparable to plate glass plus venetian blinds, but they are expected to require little or no maintenance.

Foamed-styrene sandwich panels form the roof over the engineering section. Polyethylene film was used under concrete floors on earth for waterproofing; foundation walls have a vinyl spray coating.

Laminated polyester and urethane foam form the structural support for a canopy at the front entrance. Inside, polyester is used extensively for partitions, laboratory hoods, and sinks. Much of the piping is polyvinyl chloride, and sewer drains are phenolic resin. Note, too, the urethane corrosion-resistant paint, polyester-molded exhaust fans, vinyl-foam insulation in the constant temperature room.

While the laboratory building explores the use of plastics under present design conditions, Monsanto's "House of the Future" has no such inhibitions. Its sponsors believe it illustrates the environment in which a typical American family of four will live 10 years from now. The house is on display in Disneyland, an amusement park in California.

The 144-square-meter house is built from big molded sections of fiber-glass reinforced polyester, held together by bolts and epoxy adhesives. Urethane foam, within the panels, acts as insulation.

The dwelling is shaped like a four-pronged cross and sits atop a 4.8-meter square concrete box that serves as an above-the-ground basement. Each prong of the cross contains a room. One room is a "family" or dining room, two are bedrooms, and one is a living room. Each of the four rooms has two sides filled with windows.

The kitchen, which occupies the center part of the cross, is designed not to look at all like a kitchen. A refrigerator, freezer, and cooler are hung from the ceiling masked by a plastic panel. Pushbuttons bring them into reach. An electronic range is concealed beneath a counter top and rises at the touch of a button. ●

Digested from ENGINEERING NEWS-RECORD, June 20, p28; p56

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"The Development of Executive Talent" may help you overcome the shortage of high-caliber management leadership. Basic approaches to organization planning, training methods and techniques, counseling, and evaluating the program are discussed. 576 pages; $7.75. (American Management Association, 1515 Broadway, New York 36, New York.)

Commodity Futures—Do your business or investment interests require you to buy or sell commodities? "How To Buy And Sell Commodities" will tell you what the commodity futures markets (page 23) are all about. Available in English, Spanish, German, and Dutch. 61 pages. (Merrill Lynch, Pierce, Fenner & Beane, 70 Pine Street, New York 5, New York.)

Films For Salesmen—The Dartnell Corp. has prepared half-hour sales training films—with Spanish, Swedish, Norwegian, and French language sound tracks—to help teach salesmen American selling techniques. "Overcoming Objections" is the first in the series. (Film Section, The Dartnell Corp., 4660 Ravenswood Avenue, Chicago 40, Illinois.)

For World Traders—"Export-Import Forwarding and Traffic Management" will serve as a useful guide to the diverse functions and varied services concerned with ocean traffic management. Price: $7.00. (Cornell Maritime Press, P.O. Box 386, Cambridge, Maryland) . . . If you ship to the U.S.A. via San Francisco, a new "Directory of San Francisco Area Importers and Exporters" may be helpful. Price: $1.50. (San Francisco Chamber of Commerce, 333 Pine St., San Francisco 4, California.)

"The Next Hundred Years"—This intriguing book is a summary of conferences held among businessmen and scientists to determine the future of our scientific-technological-industrial civilization. The authors analyze trends in 1) the availability of raw materials; 2) growth and feeding of the world population; 3) sources of energy; 4) technical manpower. 193 pages; $3.95. (The Viking Press Inc., 625 Madison Avenue, New York 22, New York; George Weidenfeld & Nicholson Ltd., 7 Cork Street, London W.1.)

Bulletins From Industry—A 36-page illustrated guide book explains all phases of industrial tire use. (B. F. Goodrich Tire Company, 500 S. Main Street, Akron, Ohio) . . . An illustrated brochure describes the operating advantages and economies of the Super "63" Elevator File—a new mass-record-handling machine. (Diebold Inc., 828 Mulberry Rd. S. E., Canton, Ohio) . . . The new, completely redesigned Stokes Model 741 series of fully-automatic compression molding presses are described in Catalog 200. (International Division, F. J. Stokes Corp., 5500 Tabor Road, Philadelphia 20, Pennsylvania) . . . A new brochure may help you eliminate cracking hazards in the manufacture of tools and dies. (The Carpenter Steel Company, 3085 West Bern Street, Reading, Pennsylvania.)

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Fleet Owner
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Metalworking Production (London)
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Petroleum Week
Power
Product Engineering
Textile World
Today's Secretary

McGraw-Hill Publishing Co., Inc., 330 W. 42nd St., New York 36, N. Y.

American Builder, Marine Engineering, Railway Age, Railway Track and Structures, Railway Locomotive and Cars, Railway Signaling & Communications
Simmons-Boardman Publishing Corp., 30 Church St., New York 17, N. Y.

American Business
Dartnell Publications, Inc., 4660 Ravenswood Ave., Chicago 40, Ill.

Architectural Record
F. W. Dodge Corp., 191 W. 40th St., New York 18, N. Y.

Banking
American Bankers Association, 12 E. 36th St., New York 16, N. Y.

Business
Business Publications Ltd., Mercury House, 109-119 Waterloo Road, London, S. E. 1

Ceramic Industry
Industrial Publications, Inc., 5 South Wabash Ave., Chicago 3, Ill.

The Controller
Controllers Institute of America, Inc., Two Park Ave., New York 16, N. Y.

The Economist
The Economist Newspaper, Ltd., 22 Ryder St., London, S. W. 1

Harvard Business Review
Harvard University, Soldiers Field, Boston 63, Mass.

Heating, Piping & Air Conditioning
Keeney Publishing Co., 6 N. Michigan Ave., Chicago 2, Ill.

Industrial Marketing
Advertising Publications, Inc., 200 E. Illinois St., Chicago 11, Ill.

The Management Review, Personnel, Supervisory Management
American Management Association, 1515 Broadway, New York 36, N. Y.

Metal Progress
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Modern Packaging, Modern Plastics
Breskin Publications, 575 Madison Ave., New York 22, N. Y.

The Oil and Gas Journal
Petroleum Publishing Co., 211 S. Cheyenne Ave., Tulsa 1, Okla.

The Paper Industry
Fritz Publications, Inc., 431 S. Dearborn St., Chicago 5, Ill.

Petroleum Press Service
Petroleum Press Service, 91 & 93 Bishopsgate, London, E. C. 2.

Plastics, The British Motor Ship
Temple Press, Ltd., Bowling Green Lane, London, E. C. 1.

Printers' Ink
Printers' Ink Publishing Co., Inc., 205 E. 42nd St., New York 17, N. Y.

The Rubber and Plastic Age
Rubber and Technical Press, Ltd., Gaywood House, Great Peter St., London, S. W. 1.

Sales Management
Bill Brothers Publishing Corp., 386 Fourth Ave., New York 16, N. Y.

The Times Review of Industry
The Times Publishing Co., Ltd., Printing House Square, London, E. C. 4.

Welding Engineer
Welding Engineer Publications, Inc., P. O. Box 28, Morton Grove, Ill.

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